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USSR Report

CHEMISTRY

No. 84

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ALKALOIDS

UDC 547.944/945

ALKALOIDS OF CAPPARIS SPINOSA L.

Dushanbe DOKLADY AKADEMII NAUK TADZHIKSKOY SSR in Russian Vol 24, No 10, Oct 81 (manuscript received 22 Jul 81) pp 617-620

SADYKOV, Yu. D. and KHODZHIMATOV, M., Chemistry Institute
imeni V. I. Nikitin, Tajik SSR Academy of Sciences

[Abstract] Capparis spinosa L., long used in folk medicine, was studied to learn the dynamics of alkaloid accumulation in roots through the year. The greatest accumulation came during most rapid growth, up through flowering, in July and August. Stachydrine accounted for 85.19 to 87.43% of alkaloids found in the plant roots; the authors synthesized several previously unknown salts from it. References 7: 6 Russian, 1 English.
[85-12131]

UDC 541(63 + 49)

CONFORMATIONAL ANALYSIS OF TETRAPHENYL-1,2-CYCLOHEXYLENEDIPHOSPHINE DIOXIDE AS POTENTIAL LIGAND

Kiev TEORETICHESKAYA I EKSPERIMENTAL'NAYA KHIMIYA in Russian Vol 17, No 6, Nov-Dec 81 (manuscript received 23 Dec 80) pp 833-838

BARANOV, A. P., DASHEVSKIY, V. G., MEDVED', T. Ya., PETOV, G. M., MATROSOV, Ye. I. and KABACHNIK, M. I., Institute of Hetero-Organic Compounds imeni A. N. Nesmeyanov, USSR Academy of Sciences, Moscow

[Abstract] An attempt was made to explain the conformational rigidity of the ligand and the effect of the cyclohexylene bridge at the positions of phosphoryl groups by calculating atom-atom potential functions of selected parameters. Two geometrically cis- and trans-isomers, with the cis-isomer corresponding to the axial-equatorial position on the ring, and the trans-isomer in either axial-axial or equatorial-equatorial positions, were examined. Changes in distances between donor centers of energetically optimal forms of the ligand show the possibility of effective chelating of metal cations with radii of 0.04 to 0.08 nm, such as Li^+. Figures 3; references 11 (Russian).
[105-12131]

UDC 543.42 + 541.49 + 53.083.2

STUDY OF PHOSPHORUS-CONTAINING MACROCYCLES BY DESORPTION FIELD MASS-SPECTROMETRY

Kiev TEORETICHESKAYA I EKSPERIMENTAL'NAYA KHIMIYA in Russian Vol 17, No 6, Nov-Dec 81 (manuscript received 17 Feb 81) pp 849-851

GOLOVATYY, V. G. and KOROL', E. N., Institute of Physical Chemistry imeni L. V. Pisarzhevskiy, UkSSR Academy of Sciences, Kiev

[Abstract] Desorption field mass-spectrometry, with a tungsten thread covered with a dendrite-shaped gold coating ion emitter, was used to study

8 macrocyclic ionophores (crown ethers, cryptands and their analogs). Ion emission was effected by heating the emitter up to a certain point, after which the flow decreased. For 2 compounds, low emitter temperatures, of 40 and 60° C respectively, brought intensive peaks of M+ monomer ions, with low intensity of 2M+ dimer ions. Results indicated that the molecular mass of newly synthesized macrocyclic polyethers, which can exist as both monomers and dimers, can be determined using desorption field mass spectrometry. Figure; references 7: 6 Russian, 1 English.
[105-12131]

BIOCHEMISTRY

UDC 66.096.5.099.2

KINETICS OF GRANULATION OF MICROBIOLOGICALLY SYNTHESIZED PRODUCTS IN FLUIDIZED BEDS

Moscow KHIMICHESKAYA PROMYSHLENNOST' in Russian No 1, Jan 82 pp 38-42

BUYEVICH, Yu. A, MINAYEV, G. A., PLOKHOTNICHENKO, M. V. and SUKHOV, A. S.

[Abstract] The granulation of microbiologically synthesized materials, such as fodder yeasts, yeast residues, proteins, etc., by the title process, is a significant improvement over current methods for the following reasons: 1, the new process requires fewer individual operations; 2, several operations (e.g. dehydration, granulation, etc.) may be performed in the same vessel; 3, the obtained product is drier, purer and of better quality. Equations and graphs are presented to describe the interrelationships among the parameters of the dissolved product + granular product + + fluidized bed system. Parameters include densities and viscosities; concentrations, number, shape and size of the particles, rates of addition and removal of components, etc. The obtained statistical madel may be used to estimate the engineering parameters necessary for process development. Although constructed primarily for the granulation kinetics, this model may be used to estimate hydrodynamic and thermal behavior as well. Figures 5; references 17: 15 Russian, 2 Western.
[129-12027]

UDC 615.355.012 : 615.014.455

ULTRAFILTRATION OF CULTURE LIQUIDS CONTAINING RHODEXMAN

Moscow KHIMIKO-FARMATSEVTICHESKIY ZHURNAL in Russian Vol 15, No 11, Nov 81 (manuscript received 12 Jan 81) pp 86-88

TYURIN, V. I., BIL'DYUKEVICH, A. V., GRINSHPAN, D. D. and DAPUTSKIY, F. N., Scientific Research Institute for Physical Chemical Problems, Belorussian University imeni V. I. Lenin, Minsk

[Abstract] Rhodotorula yeast was cultivated in liquid culture (Dytnerskiy, 1978) to obtain Rhodexman. The culture liquid was processed by a

super-centrifuge at 15,000-20,000 rpm, to remove cells, then concentrated by ultrafiltration through semipermeable cellulose membranes. In 10 tests, Rhodexman content in native solutions ranged between 1.9 and 2.2 g/1. Polysaccharide content by weight was determined by precipitation in a triple volume of ethyl alcohol. Glucose and organic acid contants were also determined, and ultra-violet chromatograms made. Membrane pore size, working pressure, conentration time and pH of the native solution were studied to determine optimum conditions for the process. It was determined that ultrafiltration made it possible to eliminate pH correction, vacuum distillation and alcohol precipitation procedures used to obtain Rhodexman. Figures 3; references 3 (Russian).
[92-12131]

UDC 663.15.033.001.33 663.14.636.087.24

CLASSIFYING FERMENTERS FOR PRODUCING FEED PROTEIN

Moscow KHIMICHESKOYE I NEFTYANOYE MASHINOSTROYENIYE in Russian No 10, Oct 81 pp 43-45

KUZNETSOV, A. M., engineer

[Abstract] Recognizing the lack of an orderly classification system for various types of fermenters, the author developed nomenclature according to basic design features such as the modes of power delivery and mixing. Categories include fermenters with gas phase power delivery, liquid phase types which are divided into subgroups with automatic suction devices for mixing, ejection fermenters and current fermenters, and types with combined liquid and gas phase power delivery in various combinations. Fermenters were also classified according to application into those intended for growing pure cultures and those used in industrial feed protein production. Selection of a particular design requires consideration of use, economy of operation and difficulty of producing the design. Figure; references 6: 4 Russian, 2 Western.
[96-12131]

UDC 615.33.021.6:510.67

CONSTRUCTION OF LOGIC MODELS OF MICROBIOLOGICAL PROCESSES AND THEIR USE IN PROGNOSTICATION

Moscow KHIMIKO-FARMATSEVTICHESKIY ZHURNAL in Russian Vol 16, No 1, Jan 82 (manuscript received 16 Mar 81) pp 101-105

BIRYUKOV, V. V., PAVLOV, V. S. and KATS, M. D., All-Union Scientific Research Institute of Antibiotics, Moscow; Rubezhnoye Branch of the Scientific Research Institute of Organic Intermediate Products and Dyes

[Abstract] Regression analysis was used routinely in various studies of microbiological processes and in attempts to optimize them. A number of special studies showed that this method was inadequate in certain situations. Shcheglov developed a satisfactory model based on normal operational data using a logic model in which the information about a process was represented as a logical conjunction--a combination of various levels of input factors. In the present paper the chance to prognosticate the yield of penicillin in a biosynthetic method was tested using this logic model. In 19 out of 20 test cases this model predicted correctly the outcome. Another advantage of this model is that its algorithm can be modified as new experimental data are developed. References 5 (Russian).
[136-7813]

UDC 541.128

STABLE ACTIVITY OF GAMMA-RAY IRRADIATED, ZEOLITE-CONTAINING CATALYST ZEOKAR-2

Baku AZERBAYDZHANSKIY KHIMICHESKIY ZHURNAL in Russian No 3, 1981
(signed to press 15 Dec 81) pp 27-30

ALESKEROV, A. M., RUSTAMOV, M. I., MELIKZADE, M. M., FARKHADOVA, G. T. and MAMEDOV, Kh. T., Radiation Studies Sector, Institute of Petrochemical Processes imeni Yu. G. Mamedaliyev

[Abstract] Aleskerov, et al., had shown earlier (1978) that preliminary irradiation of zeolite-containing, petroleum-cracking catalysts (e.g., Zeokar-2), using a gamma-ray K-25 apparatus, substantially increased their catalytic activity. Here, studies are reported of changes in stable activity of prior-irradiated catalysts after their regeneration. Tests showed that under optimal conditions the activity and selectivity of the catalysts suffered only slight change. Even after 30 cycles of "reaction-regeneration", the catalytic activity of Zeokar-2 could be maintained by adding new portions of irradiated catalyst or by repeated gamma-irradiation. References 1 (Russian).
[97-12131]

UDC 541.128.35 : 546.98/07 - 386

SYNTHESIS AND CATALYTIC PROPERTIES OF TRANSITION METAL COMPLEXES WITH LIGANDS THAT ARE FIXED TO OXIDE CARRIER SURFACES, PART 8: CATALYTIC PROPERTIES OF POLYNUCLEAR PALLADIUM COMPLEXES WITH PHOSPHINE LIGANDS FIXED TO SILICA GEL SURFACES

Moscow KINETIKA I KATALIZ in Russian Vol 22, No 6, Nov-Dec 81
(manuscript received 26 Mar 80) pp 1475-1479

SEMIKOLENOV, V. A., LIKHOLOBOV, V. A. and YERMAKOV, Yu. I., Institute of Catalysis, Siberian Division, USSR Academy of Sciences, Novosibirsk

[Abstract] The connection between the number of Pd atoms in an attached polynuclear complex and catalytic properties was studied by disproportionation

of cyclohexane and hydrogenation of olefins. Various products of the disproportionation were analyzed chromatographically. Results showed that the catalytic activity of P_2Pd_2 came from the fixed palladium clusters, not from metal additives. In the hydrogenation reaction, the catalytic activity of the fixed polynuclear complexes increased rapidly, while mononuclear diphosphine Pd complexes showed no noticeable catalytic action in olefin hydrogenation under moderate conditions. The mechanism of hydrogen activation on polynuclear complexes with more than 2 Pd atoms probably does not differ from H_2 activation on particles of the metal. Figures 4; references 8: 6 Russian, 2 English.
[98-12131]

NEW FACILITY CONSTRUCTION PROGRESS REPORTED

Moscow SOTSIALISTICHESKAYA INDUSTRIYA in Russian 15 Dec 81 p 3

[Article by V. Selyunin, economic reviewer: "Time to Get Started"]

[Text] The industry completed its January-November plan by 100.5 percent. In comparison with the same period of last year the increments were 3.4 percent in production volume and 2.7 percent in labor productivity. The greatest production gains were made in the Ministry of Machine Building for Animal Husbandry and Fodder Production (111 percent of the January-November 1980 level), the Ministry of Mineral Fertilizer Production (109), the Ministry of Medical Industry (108) and the Ministry of Gas Industry (107 percent).

Today, at the year's end, the country's main concern is to put the new capacities into action. It looks like things have taken a turn for the better in capital construction. Just last year, for the first time in many decades, there were no increases in unfinished construction (it even decreased by an equivalent of 1.3 billion rubles). Today, assets are concentrated on construction starts, and from all the signs, construction is going to have a "bumper crop" this year.

The last to leave the construction site are the installers: The bulk of completed facilities are transferred to clients by organizations of the USSR Ministry of Installation and Special Construction Work. At out of 215 output capacities to be surrendered to clients in January-November, the ministry has completed work on 196. This includes 96 state construction projects of priority importance, of which there were 94 in the plan. True, receipts have not been signed off everywhere yet, and adjustment operations are still going on at some facilities, but the state of these new projects cannot be doubted. New facilities that have been placed into production include a coking battery at the Altaysk By-Product Coke Plant, huge mining and concentrate production facilities in Olenegorsk, a finished rolled metal production operation in Cherepovets, an alumina plant in Nikolayev, substantial ammonium production facilities in Tol'yatti and Rossosh', carbamide production facilities with a capacity of almost 2 million tons in Berezniki and Perm', fabric production operations with an output of 111 million square meters in Osh, Orenburg and Lutsk, and much more than can be listed here.

Nevertheless, start-up of most facilities has been postponed to December: Installers will have to make three times more facilities ready for operation in the month than in January-November. Naturally this lopsidedness of the plan has complicated the situation, though judging from the progress being made, the deadlines will be met at most of the facilities. As early as in August the Ministry of Installation and Special Construction Work transferred 30,000 experienced installers from secondary and new construction projects to those in the finishing stages, and clients furnished 15,000 persons to help them. As a rule the work is proceeding in two shifts, and sometimes in three. In a word, according to a ministry estimate not more than 60 out of the 729 construction sites will be carried over to the program for the next year, to include 44 out of 306 facilities deemed to be especially important.

In comparison with previous performance this state of affairs appears rather good, all the more so because with rare exceptions, facilities at which construction is behind will in fact be completed in the first months of 1982. But the problem now is that previous performance is not an adequate yardstick today. After all, the 1982 production plan is much more intensive than that of the past year, and it was drawn up with the idea of unconditional commissioning of all output capacities.

Let us try to analyze the causes of the failures. The installers perhaps deserve the least reproach: They are energetically picking up the slack created by the construction organizations. As an example the "Yefremovkhimstroy" Trust delayed the transfer of a sulfuric acid production operation to the installers for 3-5 months. Subdivisions of the Ukrainian SSR Ministry of Industrial Construction have still not prepared the foundations for a machine at the Kiev Cardboard and Paper Combine, even though according to the norms it takes half a year to install such a machine. The USSR Ministry of Construction was extremely tardy in paving the way for installers at the Nevel' Flax Plant, the Gorkiy Residential Construction Combine and a few other construction sites.

Does this mean that the builders are to blame? In the cases named here, they are. But as a rule the causes of the failures are deeper. Whenever a client has drawn up competent plans and provided for all requirements at the construction site, the builders have rarely let him down. But today, the client is the weakest link in the construction conveyer.

The Ministry of Mineral Fertilizer Production released 15.7 million rubles for a phosphorus meal complex to be placed in operation in Dzhambul. The Ministry of Heavy and Transport Machine Building can handle such a volume, but to everyone's surprise it was discovered that start-up of the facility required completion of work worth another 8 million rubles or more. Need we belabor the point that start-up has been postponed?

The Ministry of Heavy and Transport Machine Building allocated 4.2 million rubles to creation of a steel casting operation in Zhdanov. The builders completed work worth 7.5 million rubles by November, construction is still going on, and who knows when the production operation will begin working?

Our newspaper has exposed an improper practice of the USSR Ministry of Ferrous Metallurgy many times already: It deliberately understates the estimated cost of facilities, hoping that once construction is underway no one is going to stop it, and the bank will furnish extra money. The sector's executives have evidently not made the proper conclusions from this criticism. Recently the Ministry of Heavy and Transport Machine Building placed its first pilot cold-rolling complex into operation in Lipetsk, though not for the 7.5 million rubles estimated by the client, but 12.2 million. It would seem that the trick with the estimated cost paid off--the facility is now working. But the plan requires construction of a second complex of the same kind in Lipetsk, one with a much higher output capacity. Having bogged themselves down with the first facility, builders will fall short at the second facility by precisely the same amount which they had to finish in excess of the plan at the first production operation. In the end, the metallurgists will not receive the more-important output capacities on time.

And what is most unpleasant of all is that such mistakes are, so to speak, time bombs. The 1982 construction program is based on the notion that contractors will be able to release all of their manpower from this year's construction starts for other purposes. But construction that is not finished in December will have to be finished later, thus keeping new construction sites vacant. How can we minimize the consequences of today's failures? The plan for next year is being drawn up now. And, as an example, the Ministry of Heavy and Transport Machine Building will shake down its clients for money to support construction of facilities included in the start-up plan for the first time. It is less concerned about output capacities that were started earlier but not placed into operation this year--who knows, they say, how much money will be required? But in fact it would have been better to do the exact opposite: first allocate resources to projects that are almost finished, and then give what is left over to new projects. Otherwise the outcome would be the same as what happened at the construction site of the Mazheyskiy Petroleum Refinery. One year ago the builders reported the enterprise ready for operation. And yet today, in December, they are still finishing off unplanned projects. This is no surprise, since the client allocated a million rubles while the job has required 5 million thus far, and the end of these extra jobs is nowhere to be seen. Logically, the output capacities will not be placed into operation this year either.

Here is one more lesson. A very important sheet metal shop in Temirtau will not go into operation in December as planned. The client allocated 80 million rubles to this facility in its final year of construction, even though the "Kazmetallurgstroy" Trust, which was given the job, has never been able to complete more than 50 million rubles worth of work at all of its construction projects put together. The Kazakh SSR Ministry of Heavy and Transport Machine Building brought in other organizations on a crash basis, and it prepared housing for 7,000 builders, but it never was able to complete this excessive plan. For similar reasons completion of large output capacities at the Achinsk Petroleum Refinery is being postponed: The program for the final year of construction is more than three times larger than the amount of assets actually assimilated in the previous year.

Planners of the USSR Ministry of Ferrous Metallurgy and the USSR Ministry of Petroleum Refining and Petrochemical Industry who added these projects to the list of construction starts were aware that they would not be finished: Neither facility will go into operation before the third quarter of next year. The intent was simple: Of course, it would have been unrealistic to count on finishing the production capacities, but the very fact that they were included in the plan for finished construction would discipline the builders and encourage them to get on with it. Such tricks must not be permitted in the 1982 plan. The principle of concentrating resources on projects already underway must be understood literally, as a party principle, and not to one's own liking.

Finally, a number of output capacities will not be placed into operation this year due to a shortage of equipment. It is now too late to appeal to the suppliers to adhere to their deadlines. Moreover machine builders were unable to fulfill some of their orders due to a shortage of metal. Under these conditions there can be no justification for sending any of the construction equipment to the construction site. Here is what was reported to the editor's office by Soyuzglavkhimkomplekt Chief A. Kudryavtsev: Back in July the main administration delivered all of the required equipment to construction starts at the Novodzhambul Phosphorus Plant, but the latter's governing board used the equipment, worth 2.5 million rubles for other than its intended purposes, and some of it perished due to poor storage. The same picture can be seen at the Fergana Nitrogenous Fertilizer Plant. These facts deserve the attention of the Ministry of Mineral Fertilizer Production.

There are 2 weeks left until the end of the year. These are the hardest days for builders and installers. With a little more effort, the country will be able to congratulate them on completing the first year of the five-year plan with adequate success.

11004
CSO: 1841/67

FERTILIZER INDUSTRY CONSTRUCTION WORKERS ADOPT ANNUAL PLEDGES

Moscow SOTSIALISTICHESKAYA INDUSTRIYA in Russian 7 Feb 82 p 1

[Article: "Full Output Ahead of Schedule!"]

> [Excerpts] The socialist pledges of the collectives of construction, installation and planning organizations and enterprises involved in mineral fertilizer production on hastening the commissioning of output capacities in fertilizer industry.

Laborers, engineers, technicians and white collar workers of the "Krasnodarkhimstroy" and "Meleuzkhimstroy" trusts of the USSR Ministry of Industrial Construction, the "Cherepovetskhimstroy" and "Apatitstroy" trusts of the USSR Ministry of Construction of Heavy Industry Enterprises, the "Novgorodkhimstroy" Trust of the USSR Ministry of Construction, a number of organizations and enterprises of the USSR Ministry of Installation and Special Construction Work, planning institutes, the Krasnodar and Meleuzov chemical plants and the Cherepovets "Ammofos", Kirov "Apatit" and Novgorod "Azot" production associations of the Ministry of Mineral Fertilizer Production have decided to initiate a socialist competition to hasten construction of fertilizer industry enterprises and place them into operation as quickly as possible.

The collectives of these enterprises and organizations have adopted the following socialist pledges:

At the Krasnodar Chemical Plant:

Place production capacities into operation totaling 1.4 million tons of complex granulated fertilizers in 1982--a year ahead of the deadline foreseen by the plan.

By improving the organization of construction, introducing advanced skills, making fuller use of machines and mechanisms and reducing the proportion of manual labor, exceed the planned target for growth in labor productivity by 0.5 percent. Have khozraschet teams complete not less than 55 percent of the construction and installation jobs. Complete all construction, installation and initial adjustment operations with grades of not less than "good" and "excellent."

At the Meleuzov Chemical Plant:

Complete construction of a complex producing 1.4 million tons of compound mineral fertilizers and surrender it for adjustment operations ahead of schedule, by 7 November 1982, and have it working by 24 December. Complete 50 percent of the total volume of work by the team contract method, and raise the level of fully prefabricated construction of industrial facilities to 75 percent. On this basis, surpass the target for growth in labor productivity by not less than 0.3 percent.

At the Cherepovets "Ammofos" Production Association:

Make capacities with an output of 300,000 tons of wet-process phosphoric acid ready for operation by 25 December. Surpass the planned target for growth in labor productivity by 0.2 percent in 1982 by introducing progressive processes and fully mechanizing construction.

At the Kirov "Apatit" Production Association:

Make production capacities extracting 2.1 million tons of apatite-nephelite ore ready for operation ahead of schedule, by the 65th anniversary of Great October. Build the main facilities of the complex by the mobile team flow-type production method. Complete the annual commercial construction product sales plan by 29 December. Surpass the planned target for raising the rate of growth in labor productivity by 0.1 percent.

The collectives of the chemical plants and the "Apatitstroyindustriya" Outfitting Production Association will furnish equipment, materials and articles to the construction site according to approved schedules for early commissioning of the pilot complex.

At the Novgorod "Azot" Production Association:

Complete the basic technological operations for the first generation of a compound mineral fertilizer production operation with a capacity of 922,000 tons and have it working by 1 July. Complete the volume of construction and installation jobs planned for 1982 at the second generation of the complex by 20 December, and ensure its commissioning by December of the next year.

The association collective will see that the construction site will receive all supporting equipment, articles and materials in accordance with the schedule.

The "Stroykomplekt" and "Stroyindustriya" trusts, the Novgorod "Promstroymaterialy" Association and the "Novgorodavtodor" Trust will ensure delivery of construction materials on schedule, and the "Novgorodstroytrans" Trust and the oblast transportation administration will ensure delivery of workers and materials to the facilities under construction.

The socialist pledges were discussed and approved at general meetings of the collectives of the enterprises and the construction, installation and planning organizations.

11004
CSO: 1841/113

CHEMISTRY PLAYS MAJOR ROLE IN SCIENTIFIC-TECHNICAL PROGRESS

Kiev PRAVDA UKRAINY in Russian 6 Jan 82 p 1

[Article: "Chemistry for the Ideological Propagandist"]

[Text] The significance of chemical science in industry has grown immeasurably in the modern scientific-technical revolution. Arisal of new sources of energy, creation of various synthetic materials with properties not possessed by natural materials, expansion of their raw material base and use of gas and petroleum in chemical synthetic processes are all associated with advances in chemistry and associated sciences.

Chemistry gets its raw materials from the treasurehouse of nature. Great is the wealth of our subsoil. Before the revolution, however, phosphorites were imported into Russia from distant islands of the Pacific and from Africa, and saltpeter was shipped from Chile.

Today our chemical industry gets all of its raw materials from domestic sources, and in turn it is a tremendous raw material base for all industrial sectors, and an important factor of agricultural development.

Chemical industry has been enriched with modern equipment and with production of many formerly unknown materials, which not only compete with traditional materials but also successfully supplant them.

By using 1 ton of plastic, we can save 1,285 rubles in electrical engineering, 2,570 in motor vehicle construction, 3,870 in instrument making, 1,015 in transport and agriculture and machine building and 1,075 rubles in construction.

By using plastics, we save hundreds of thousands of tons of ferrous and nonferrous metals, and about a million cubic meters of wood and lumber. We now produce more than 1 million tons of chemical fibers and filaments per year, 70 percent of which are used to produce consumer goods. Much attention is being devoted to producing plastic tubing, synthetic rubber and high-quality polymers with specific technical characteristics.

Soviet chemical industry is constantly developing at a preferential rate in comparison with many other sectors and all industry as a whole.

The USSR is second in the world in the total volume of chemical production, and first in mineral fertilizer production.

Chemistry industry of the Donets Basin has become an important element of the national economy. Its raw material base is huge: Coal, combustible gas, table salt, chalk, potassium salts, fluorspar, kaolin, dolomite, cinnabar and much else. Modern Donets chemistry is multifaceted as well: fertilizers and acids, plastics and paints, chlorine, ferrite powders and chemical reagents. The Donets Basin is the Ukraine's leader in production of mineral fertilizers, phthalic anhydride, anthracene carbon black, soda ash and caustic soda, and in vat dye production it is first in the Soviet Union. The largest enterprises of the sector are the Severodonetsk "Azot" Production Association, the Rubezhnoye "Krasitel'" Production Association, the Donetsk Chemical Reagent Plant and the Slavyansk "Khimprom" Production Association.

In the 11th Five-Year Plan chemical industry will witness an increase in its possibilities and tasks in solving the greatest national economic problems associated with supplying the public with food, clothing and footwear and promoting technical progress in industry, transportation and agriculture. Science and practice have demonstrated the high effectiveness of outlays to chemicalize farming. In a number of cases more than half of the yield increment is being achieved owing to mineral fertilizers. The amount of mineral fertilizers being delivered to agriculture increased by almost three times in the last 15 years. About 40 percent of their quantity are represented by nitrogenous fertilizers, 27 percent are phosphate fertilizers and 25 percent are potassium fertilizers.

The 26th CPSU Congress posed many new tasks before the country's chemical industry. By the end of the 11th Five-Year Plan chemical and petrochemical industry is to raise its production volume by 30-33 percent and increase production of mineral fertilizers to 150-155 million tons (in arbitrary units), synthetic resins and plastics to 6-6.25 million tons and chemical fibers and filaments to 1.6 million tons. Production of synthetic rubber as natural rubber substitute will grow, and the assortment and quantity of rubber footwear, household chemical articles and photographic materials will improve.

The party believes all-out development of chemical industry to be one of the most important tasks. Completing it is a matter of honor of the sector's laborers.

11004
CSO: 1841/113

ACADEMICIAN URGES ACCEPTANCE OF ATOMIC POWER IN CHEMICAL INDUSTRY

Moscow SOTSIALISTICHESKAYA INDUSTRIYA in Russian 7 Feb 82 p 2

[Article by Academician Ya. Kolotyrkin: "Atomic Energy for Chemistry"]

[Text] Predictions of the future always contain an element of exaggeration that allows us the liberty of treating them with an air of condescension. Perhaps this is why many feel that apprehensions concerning exhaustion of the petroleum and gas reserves, which provide for about 70 percent of mankind's energy needs, are premature. But the reality of this threat would become obvious once we consider that fuel consumption doubles in an average of every 10-15 years. Consequently this means that the explored petroleum and gas reserves will be enough to cover the needs of only a few decades. This does not mean that they will be pumped out completely from the earth. But their extraction will require almost as much energy as is stored in these forms of fuel. Thus they will have to be automatically excluded from the list of our energy resources.

This prediction raises the question "To be or not to be?" before chemistry in the literal sense. By the end of this five-year plan almost 98 percent of the products of organic synthesis--all sorts of films, plastics, fibers and coatings--will be produced out of petroleum and gas. The demand for these materials is growing so swiftly that the raw material problem will become acute in the next few years. Nonetheless, significant quantities of petroleum and gas are being used in chemistry as common fuel, as a means to achieve the high temperatures required in the processes. The aspiration to do away with such consumption is what gave birth to the question of converting chemical production operations to new sources of energy.

What are these sources? I fear that the answer will not be distinguished by originality: I am referring to the use of atomic reactors as the power source of chemical enterprises. Such a solution promises not only a dramatic decrease in consumption of petroleum and gas as fuel, but also the most economical satisfaction of the demand of chemical production operations for various forms of energy.

Chemistry satisfies a large share of its energy needs with, in addition to fuel, electricity and heat. In this case we often find that electricity carried to chemical combines by power transmission lines at the price of considerable losses is converted back into heat at these combines. But use of nuclear power sources would exclude these losses and eliminate the need for erecting power transmission lines. But the main payoff is elsewhere. Among the sectors having a claim on atomic power, chemistry has the indisputable advantage: Only it is capable of making use of the unique "waste" of nuclear processes--radiation--with a high impact.

Until recently we have interpreted the radiation accompanying nuclear transformations as a necessary evil, one compelling us to implement complex protective measures. But radiation is energy. Moreover, from the standpoint of a consumer such as chemistry, this is highly "concentrated" energy.

In the final analysis the essence of most chemical processes boils down to the same thing: Bonds between atoms must be broken in the molecules of primary substances, and the "fragments" formed must be brought together into the molecules of the end product. But in practice we often find that the conventional means of affecting such substances--high pressure and temperature for example--are unable to surmount the strength of chemical bonds. And so the process we desire cannot be brought into being. Radiation or, in other words, ionizing emissions, contain such a powerful "charge" of energy that they are capable of breaking the strongest bonds in a substance. Therefore the most unusual processes may be carried out by their assistance. And traditional processes may be performed at lower temperatures and pressures, which promises a sizeable payoff.

Of course the problems associated with practical use of radiation have been found to be rather complex: Its destructive power at first seems totally incompatible with the delicate mechanism of chemical reactions. But profound theoretical work and extensive research on the problem by both our sector's main institute , the Physicochemical Institute imeni L. Ya. Karpov, and other organizations have made it possible to create a large number of effective radiochemical processes. Many of them have already left the laboratories and demonstrated their advantages in experimental industrial conditions, meaning that they can now be run on a broad scale.

Take as an example processes in which polymers are modified by radiation. Additional cross-links may be created between the molecules of polyethylene, a material we all know, by means of ionizing emissions. This dramatically improves the material's properties. In particular such cross-linked polyethylene, when used as cable sheathing, not only conserves nonferrous metals but also replaces Teflon, which is so expensive and hard to work. The resulting savings is on the order of 100-200 rubles for each kilometer of insulated cable.

In similar fashion polyethylene tubing may be made capable of carrying hot water. It can also replace metallic tubing in industrial and municipal water supply systems. The demand for such tubing is measured in the tens of thousands of tons. Correspondingly the reserves for economizing on metal are great as well. Irradiated polyethylene may also be used to face steel pipes carrying hot aggressive liquids, thus significantly lengthening their life. Radiation processing improves the characteristics of mixed concrete-polymer materials as well--their strength and their resistance to the effects of moisture, aggressive substances and low temperatures. These properties are especially important in relation to underwater and hydraulic engineering facilities, sea water desalinization plants and chemical enterprises. A radiation process for modifying wood created in our country is raising special interest. It transforms low-grade wood into materials with qualities surpassing those of even oak and beech.

All of these resource conserving processes have now been perfected. But until recently, absence of sufficiently powerful and economic radiation sources hindered their broad introduction. Soviet scientists were the first to demonstrate by their research that the reactors of atomic electric power plants may be used as highly economical sources of radiation. To permit this, they would have to be outfitted with so-called radiation networks--devices which carry gamma-emissions from the reactor core into a radiochemical facility. Our country was the first to develop such networks with an indium-gallium carrier. They have now been serving successfully for a number of years at four experimental reactors.

Calculations show that a radiation network with gamma-power on the order of 100-200 kilowatts may be created at each type "RBMK" reactor operating at, for example, the Leningradskaya AES. In other words it would replace radio-isotope sources requiring 10-20 tons (!) of radium. The annual productivity of a facility with such a network may reach 1,000-2,000 tons of irradiated hot water tubing or 25,000-50,000 cubic meters of concrete-polymer articles. And the economic impact from just these modified materials alone would be 10-15 million rubles per year.

Thus not only the technical possibility but also the economic feasibility of creating radiochemical production operations based on atomic power plant reactors has already been demonstrated. There is a real foundation for creating such operations today. A course toward preferential development of atomic power was charted by the 26th CPSU Congress. In this connection chemists submitted the proposal of outfitting at least one of the power plants now under construction with radiation networks--industrial this time, rather than just experimental. In particular they were referring to the Ignalinskaya AES in Lithuania.

This proposal was supported by the president of the USSR Academy of Sciences, Academician A. Aleksandrov. Power engineers displayed interest in it as well: Radiation technology permits fuller use of the possibilities of nuclear fuel and reduction of operating expenses and the cost of the electric power produced. Nevertheless the reactor builders preferred to turn down this task.

Unfortunately there are all the grounds for expecting that bureaucratic problems will continue to delay practical use of radiochemical technology in the future. As an example, radiation processes for waste utilization have been under development in many countries in recent years. Thus irradiation of shavings, chips and sawdust in woodworking industry may increase the pulp yield, resulting in significantly larger quantities of cellulose. And irradiation of wastes containing cellulose carries the promise of a noticeable increase in production of glucose, which is needed for production of feed additives in animal husbandry. The importance of these directions to the national economy is obvious. But once again the same question arises: How and on what basis do we resolve the interests of many different departments?

This question remains open even where the advantages of radiation technology are fully in keeping with the tasks of power engineering. As we know, erection of "atomic boilers" to supply heat to large cities will begin in the present five-year plan. By the logic of it all, these reactors should be outfitted with radiation networks to utilize gamma-emissions, which would be the most universal and economical means by which to decontaminate domestic and industrial wastes, which could then be used as fertilizer. However, this process has not been included in the plans either.

In light of the above, conversion of chemical enterprises to nuclear power sources has not only economic but also legal significance: It would legalize radiation processes as an inseparable part of an integrated technology. Were we to account for the particular features of this technology, and consider the demand for different forms of energy, we could create special reactor designs that would be the most effective in chemical production operations.

Production of a new type of fertilizers--capsulated--may also be organized on the basis of nuclear power sources. Nutrients packaged by a radiation process in polymer capsules would have a longer life and would help to raise crop yields. According to preliminary estimates the economic impact from applying a ton of such fertilizer to, for example, cereal and leguminous crops would be about 3,000 (!) rubles.

The significance of converting to nuclear power would rise another order of magnitude if we consider the principal directions of scientific-technical progress. As we know, one of them calls for assimilation of the production of synthetic liquid and gaseous fuels from coal, shale and bituminous sand. By using nuclear power sources, we would be able to organize closed production cycles and dramatically reduce the discharges of toxic sulfur, nitrogen and carbon oxides into the atmosphere.

Nuclear power sources may play the decisive role in solving the problems of hydrogen production as well. The plans for the future have basically been based on acquiring hydrogen from natural gas and hydrocarbons, though we do have a cheaper raw material available--water. But its decomposition by electrolysis remains expensive. Therefore it is interpreted only as a means of using up "throwaway" energy that becomes available when the consumer load of an atomic power plant drops. Research conducted in recent years has shown that radiation can place water molecules into an excited state, in a sense preparing them for decomposition. This would reduce the cost of electrolytic hydrogen by at least 30 percent.

To be specific, chemical production operations have no alternatives other than conversion to nuclear power sources. This is admitted not only by chemists but also their associates. Moreover, a decision was made 7 years ago to unite efforts with the purpose of creating an experimental industrial atomic power and chemical facility. In addition to producing electric power it was to support production of about 3,000 tons of radiation-modified polyethylene tubing for hot water supply systems. In the last few years there has been extensive research and development, and a plan for a high-temperature reactor with spherical cells was drawn up. Erection of the facility was supposed to have started last year, but construction has now been postponed indefinitely. This threatens solution of the entire complex of problems associated with using nuclear power sources and capitalizing on the advantages of radiation technology. Because of their scale and significance, these problems must become the object of a specific-purpose integrated program conducted under the supervision of the USSR State Committee for Science and Technology. And surveillance over its implementation must be the most effective possible.

11004
CSO: 1841/113

BRIEFS

NEW AIR-FRACTIONATION STATION--Ural machine builders started up production of a new item during the socialist competition in honor of the 60th anniversary of the USSR. A new air-fractionation station has been manufactured at the Sverdlovsk Oxygen Machine Building Plant. It is intended for acquisition of high-purity liquid and gaseous nitrogen and oxygen from air. The new unit is 40 percent more powerful than previous models. The annual economic impact from its use exceeds 14,000 rubles. This year the units will be placed into series production. [By M. Anatol'yev, Sverdlovsk] [Text] [Moscow SOTSIALISTICHESKAYA INDUSTRIYA in Russian 15 Jan 82 p 1] 11004

HERBICIDE PRODUCTION UP--"Exceed the production plan each day"--this is the slogan under which the collective of the Ufa "Khimprom" Association is laboring. Last year it produced and provided agriculture with 5,500 tons more highly effective herbicides than planned. These herbicides were used to weed cereal and industrial crops. Now, due to reconstruction, modernization and improvement of the effectiveness of the work of equipment, the collective has decided to increase production of valuable preparations by 3,500 tons. Rural laborers will receive not less than 1,000 tons of dialin, a new corn weeding preparation. A competition for early completion of the annual plan assumed broad scope in the very first days of this year in the shops and sections. The chemists are running the production processes with high proficiency, and they are surpassing their daily targets. Machine operators of Shop No 9--I. Karavayev, T. Abdrakhmanov and P. Migunov--are achieving high indicators these days. [By I. Payvin, Ufa] [Text] [Moscow SOTSIALISTICHESKAYA INDUSTRIYA in Russian 23 Jan 82 p 1] 11004

RECYCLED WATER--The Pervomayskiy Chemical Plant, one of the largest in the sector, has been completely converted to a closed water recycling system. The high-capacity thermal desalinization unit started up yesterday was the last unit of the nature-conserving complex. Highly mineralized wastes that had not formerly been treated are now subjected to evaporation. Valuable chemicals are extracted from the resulting solid precipitant, and the hot distilled water is used for industrial needs. Such water conserving complexes, which include mechanical, biological and physicochemical treatment, are to be built during the present five-year plan at a number of major enterprises of chemical industry and other industrial sectors in the country. [Text] [Moscow SOTSIALISTICHESKAYA INDUSTRIYA in Russian 24 Jan 82 p 1] 11004

SULFURIC ACID PRODUCTION--Instead of the 3 months foreseen by the norm, the collective of the Almalyk Chemical Plant needed only 3 weeks to reach the planned output capacity of a new sulfuric acid production complex. Acid production has now doubled at the plant. All mineral fertilizer production lines are now fully supplied with this raw material. [Text] [Moscow SOTSIALISTICHESKAYA INDUSTRIYA in Russian 29 Jan 82 p 1] 11004

BARNAUL RAILROADERS EXCEL--The leading mechanics of the Barnaul Locomotive Depot are now driving the first trains on economized fuel and power. They include Cavalier of the Order of Lenin N. Skripnikov and Hero of Socialist Labor V. Dokukin, A. Glushenko and others. The collective of the Barnaul Rail Car Depot Motor Transport Center began the new year with a good head start. These railroaders are credited with repairing a thousand and a half more air distributors than planned last year. They intend to reach the target of two and a half months of this year by 8 March. A thousand railroaders of the Altaysk department of the railroad are laboring these days under the slogan "Sixty Shock Labor Weeks for the 60th Anniversary of the USSR." The collectives of 20 of the department's stations, to include Zarinskaya, Biysk, Korchino, Gilevka, Len'kov and Ust'-Tal'menskaya, are far ahead of the work schedule. [By N. Il'ichev, Barnaul] [Text] [Moscow SOTSIALISTICHESKAYA INDUSTRIYA in Russian 7 Feb 82 p 1] 11004

YAVAN ELECTROLYZERS--The second half of the series of electrolyzers intended for production of chlorine and caustic soda was started up at the end of last year at the Yavan Electrochemical Plant. The first strand of a highly intricate production complex has now gone into operation. The collective of chemists is now faced with the task of raising it to its planned output capacity as quickly as possible. With time, this chlorine and caustic soda production operation will fully satisfy the raw material demands of all of the other production operations at the plant. [Excerpt] [Dushanbe KOMMUNIST TADZHIKISTANA in Russian 13 Jan 82 p 1] 11004

CSO: 1841/113

BRIEFS

CHEMICAL CONSTRUCTION ON SCHEDULE--Builders of the Severodonetsk "Promkhimmontazh" Trust placed about 20 industrial facilities into operation this year. And now a new labor victory--the annual plan for construction and installation was completed ahead of schedule, and more than 30 million rubles of capital investments were assimilated. A socialist competition in honor of the 60th anniversary of the USSR has assumed broad scope in the trust. Examples of shock labor and high work quality can be found in the teams led by A. Gadiyak, A. Chebotarev, G. Zarutskiy and others. A decision has been made to do extra construction and installation worth 3 million rubles in December. [By V. Mikhaylichenko, Voroshilovgrad Oblast] [Text] [Moscow SOTSIALISTICHESKAYA INDUSTRIYA in Russian 15 Dec 81 p 1] 11004

CHEMICAL INSTITUTE REWARDED--The labor of workers of the Moscow Scientific Research Institute of Organic Semifinished Products and Dyes has been invested in the products of many sectors. Production of motion picture film and plastics, quantum electronics and light industry, perfume manufacture and machine building--such is the sphere of application of the developments of the capital's chemists. The collective of the scientific research institute has been awarded the Order of the Red Labor Banner for its successes in scientific research and production aimed at developing precision organic synthesis industry. A solemn meeting devoted to presentation of this award to the institute was held on 24 December in Moscow. USSR Council of Ministers Deputy Chairman L. A. Kostandov congratulated the collective and secured the order to the institute's banner. [Text] [Moscow SOTSIALISTICHESKAYA INDUSTRIYA in Russian 25 Dec 81 p 3] 11004

PHOSPHORUS SALT PLANT--Chemists of the Chiryurtovsk Phosphorus Salt Plant are celebrating the enterprise's 10th anniversary. The collective's gift of labor on this date was completion of the annual plan in relation to the principal technical-economic indicators. The collective produced 22,100 tons of feed precipitate--a stimulatory feed additive. Another 1,100 tons of this valuable product will be produced before the end of the year. All new shops, sections and teams of Dagestan enterprises are reporting attainment of their target. More than 500 workers of the flagship of Dagestan industry, the Plant imeni Gadzhiyev, have already completed their personal annual plans. Among them are the best producers of teams led by V. Mirzoyev, N. Abashin and V. Kovalev, and the victors of the first weeks of the labor competition in honor of the 60th anniversary of the USSR's formation. [By O. Sanayev, Makhachkala] [Text] [Moscow SOTSIALISTICHESKAYA INDUSTRIYA in Russian 27 Dec 81 p 1] 11004

PULP-AND-PAPER PLANT--The first generation of a pulp-and-paper plant of the Ust'-Ilimsk lumber complex has been made ready for operation. Output capacities capable of producing another quarter of a million tons of bleached pulp, necessary for production of high-quality paper, will begin working in just a few days. It took just a year for builders, installers and operators of this giant of wood-chemical industry in the country's east to double its potential. Construction projects underway include, besides a second-generation pulp-and-paper plant, a timber transloading base capable of handling a million cubic meters of timber, and two log receiving and trimming lines. The complex's work goes on as its second generation is prepared for operation. Operators are laboring here together with the builders and installers. The "worker relay," which came into being during erection of the first generation of the complex, is helping the laborers not only to meet the schedule but even to anticipate it. [By V. Khodiy, Ust'-Ilimsk, Irkutsk Oblast] [Text] [Moscow SOTSIALISTICHESKAYA INDUSTRIYA in Russian 30 Dec 81 p 1] 11004

KREMENCHUG INDUSTRIAL CARBON--The Kremenchug Industrial Carbon Plant has earned its name as an enterprise producing high quality products. Its production processes are constantly undergoing improvements, equipment and apparatus are being updated, and plant standards have been introduced. As a result, all three types of carbon black produced by the plant and intended for production of tires and other industrial rubber articles bear the honorary pentangle. It has been many long years since the collective has received a complaint from consumers. [By A. Vyatkin] [Text] [Moscow SOTSIALISTICHESKAYA INDUSTRIYA in Russian 7 Jan 82 p 2] 11004

GASOLINE PRODUCTION--Dozens of cubic meters of crude condensate are now being processed into gasoline at the Yakutsk-Mastakhsk gas deposit, one of the largest. Yakutsk gasoline has few toxic impurities, it does not produce carbon deposits, and addition of light fractions makes engine starting easier at low temperatures. But the main advantage is that fuel need not be transported thousands of kilometers. This year the facility at the Mastakhsk deposit for producing gasoline out of condensate will be expanded. The improvements will noticeably raise its output capacity. [By V. Fedorov] [Text] [Moscow SOTSIALISTICHESKAYA INDUSTRIYA in Russian 7 Jan 82 p 2] 11004

CSO: 1841/67

MINERAL FERTILIZER INDUSTRY IN 11TH FIVE-YEAR PLAN

Moscow KHIMICHESKAYA PROMYSHLENNOST' in Russian No 1, Jan 82 pp 3-9

PETRISHCHEV, A. G., minister of the USSR mineral fertilizer industry

[Abstract] During the 10th Five-Year Plan, emphasis has been on developing efficient production, increasing output (32.7% overall) and increasing the quality and diversity of both fertilizers and pesticides. During the 11th Five-Year Plan, the emphasis is on higher-grade and more concentrated products plus more efficient utilization of plant facilities, raw materials and energy. Projections call for the conservation of around 7.5 million Kwatt-hours, due mainly to new technologies in ammonia, carbamide, and large-scale methanol production. By 1985, agriculture will require an estimated 120 million tons of mineral fertilizer, including 5 million tons of additives. The overall increase projected for 1985 is 45%; however both nitrogen and phosphorus fertilizers are expected to increase by around 50%. Much of the developmental work will be performed by joint programs with the major state research centers. Priority projects include the purification and concentration of intermediate products, such as phosphoric acid, especially those obtained from lower-grade ores and reactants.
[129-12027]

UDC 66.012-52 658.011.56

AUTOMATION OF CHEMICAL PRODUCTION EQUIPMENT

Moscow KHIMICHESKOYE I NEFTYANOYE MASHINOSTROYENIYE in Russian No 10, Oct 81 pp 14-15

OLERINSKIY, B. I., SINITSYN, A. I. and GUREVICH, M. A., candidates of technical sciences, and MALKOV, Ye. M., engineer

[Abstract] Equipment produced at the Leningrad Scientific Research Institute for Chemical Machine Building includes reaction vessels with hermetic drive and piston compressors, with remote control and monitoring systems and safety devices. Technical and economic features of the equipment are discussed. Such equipment is used to produce high-density

polyethylene with cost effectiveness while lightening the labor input. Factors involved in production include careful preparation of the job description of the machinery, its relation to other equipment, and evaluation of functional and structural parameters after installations are completed. Several specific applications are described.
[96-12131]

UDC 631.81

MINERAL FERTILIZER INDUSTRY FOR AGRICULTURE

Moscow KHIMIYA V SEL'SKOM KHOZYAYSTVE in Russian No 1, Jan 82 pp 3-5

PETRISHCHEV, A. G., minister for mineral fertilizer production

[Abstract] To help solve chronic food production problems, preparation of mineral fertilizers has been placed under the control of a separate ministry, whose head is reporting in this article progress in the production of various categories of mineral fertilizers and chemicals for plant protection. He relates increases in per hectare application of these chemicals to increased yields of grains, sugar beets and cotton. Fertilizers discussed include ammonia and anhydrous ammonia and other nitrogen, phosphorous and potassium compounds. Qualitative improvements include more regular sizes in granulation and caking prevention for easier transport and application. Further advances in technology will require intensifying research. Results of plan fulfillment are presented.
[119-12131]

UDC 630*863.5:331.876

NUTRIENT YEAST PRODUCTION QUOTAS EXCEEDED IN 1981

Moscow GIDROLIZNAYA I LESOKHIMICHESKAYA PROMYSHLENNOST' in Russian No 1, 1982 (signed to press 18 Jan 82) p 1

[Abstract] Participants in the All-Union Socialist Competition were honored for producing over a million tons of yeast protein. The top producers and the amounts by which they exceeded their quotas for the first eleven months of 1981 are these: Bobruysk Hydrolysis Collective, 737 tons of high quality yeast protein; the Rechitsa Factory, 414; Kropotkin, 245; and Fergana, 173 tons. Each ton of yeast protein is the equivalent of 1.5-2.5 tons of meat (live weight) or 25,000-35,000 eggs. Comrade L. I. Brezhnev, at the November, 1981 plenum identified food production as the most important problem in the entire 11th Five-Year Plan. At this same meeting, it was mentioned that each branch of industry, each union republic, kray, oblast city and rayon must participate in solving the

problems associated with the large-scale development of the economic potential of the farming industries, the energy-fuel complexes, and with the improvement of the Soviet life-style.
[130-12027]

UDC 630*863;658.26.001.8

BASIC DIRECTIONS IN UTILIZATION OF SECONDARY ENERGY RESOURCES IN MICROBIOLOGICAL INDUSTRY

Moscow GIDROLIZNAYA I LESOKHIMICHESKAYA PROMYSHLENNOST' in Russian
No 1, 1982 (signed to press 18 Jan 82) pp 2-3

DENISOV, L. N., Main Administration for the Microbiological Industry

[Abstract] "Our furthest advances," said Comrade L. I. Brezhnev, "will increasingly depend on skillful and efficient utilization of our natural resources: labor, capital, fuel and raw materials, and the products of our fields and farms." The microbiological industries have many processes where conservation techniques may be applied. For example, about 30% of the thermal energy used in the hydrolyzers is for heating water. Thermal energy from the residual hot water and steam, as well as that from the vacuum evaporators and other units, can be recycled. Another example is the protein-vitamin concentrators, where about 60% of the total electrical energy requires is ultimately lost. Thermal energy can be recovered after sterilization by cooling the apparatus, contents, pipes, and other fixtures to 32-36°C. Several institutes, such as the All-Union Scientific Research Institute of Biotechnology, are collaborating with the factories to develop new equipment including heat exchangers and to establish the most practical methods of recovering and utilizing waste heat. A phase-change heat exchanger, which operates at a stable temperature compatible with the fermentation units, has high priority.
[130-12027]

COMBUSTION

UDC 541.64 : 546.18

EFFECT OF PHOSPHORUS ON HIGH TEMPERATURE PYROLYSIS OF POLYMETHYLMETHACRYLATE

Moscow VYSOKOMOLEKULYARNYYE SOYEDINENIYA in Russian Vol 24, No 1, Jan 82
(manuscript received 13 Aug 80) pp 63-66

GAL'CHENKO, A. G., KHALTURINSKIY, N. A., SAKHAROVA, A. A., POPOVA, T. V.,
FRUNZE, T. M. and BERLIN, Al. Al., Institute of Chemical Physics,
USSR Academy of Sciences

[Abstract] The breakdown of polymethylmethacrylate (PMMA) containing various phosphorus compounds, and related gas formation and the temperature of polymer surface layers, were studied using copolymers of methylmethacrylate and diallymethylphosphonate, and using phosphorus-containing PMMA. The effect of environmental temperature on gas formation and on the polymer surface temperature showed that the presence of phosphorus brought temperature increases on the polymer surface, and decreases in gas formation. Thus the introduction of phosphorus into PMMA compounds significantly reduced the rate of polymer breakdown. Figures 3; references 9: 7 Russian, 2 English.
[104-12131]

ELECTROCHEMISTRY

UDC 541.13

EFFECT OF PLASTICIZING SOLVENT ON ELECTRODE SELECTIVITY OF VALINOMYCIN MEMBRANE FILMS

Moscow ELEKTROKHIMIYA in Russian Vol 18, No 1, Jan 82
(manuscript received 21 Jan 81) pp 59-68

MIKHEL'SON, K. N., GREKOVICH, A. L., MATEROVA, Ye. A. and FILIPPOV, S. Yu.,
Leningrad State University imeni A. A. Zhdanov

[Abstract] An equation was developed for the potential of a membrane containing neutral complex components (which include the solvent). The theoretical ratios were verified experimentally. Selective properties of the membrane were tied to properties of the solvent and the concentration of neutral complex components. Calculations are presented to show theoretical membrane selectivity and a coefficient of selectivity, with the conclusion that the solvent's contribution to electrode selectivity of the membrane depends both on the nature of the solvent and on the concentration of the complexon. A polyvinylchloride membrane with neutral valinomycin was used with tributyl-, trihexyl- and trioctyl- phosphate extragents containing an electron-donor phosphoryl group, to test the calculated results. Experimental data coincided with theoretical expectations, and permitted the authors to develop equations of selectivity as a function of membrane composition for complexes of lithium with cesium and potassium. Figures 4; references 7: 5 Russian, 2 English.
[111-12131]

UDC 541.13 : 577.37

MECHANISM OF REVERSIBLE ELECTRIC BREAKDOWN OF TWO-PLY LIPID MEMBRANES IN PRESENCE OF UO_2^{2+}

Moscow ELEKTROKHIMIYA in Russian Vol 18, No 1, Jan 82
(manuscript received 10 Dec 80) pp 98-102

CHERNOMORDIK, L. V., SUKHAROV, S. I., ABIDOR, I. G. and CHIZMADZHEV, Yu. A.,
Institute of Electrochemistry, USSR Academy of Sciences, Moscow

[Abstract] Processing of a two-ply lipid membrane made of azolectene and phosphatidylserine with UO_2^{2+} ions brings increased electric durability,

but under certain conditions reverse resistance is reduced by a factor of more than 10^7. This phenomenon was investigated for conductivity through a 1 mm opening in a bichamber teflon cell at 30°C. Measurements for capacitive values were complicated by a strong conductive flow, where it was difficult to control capacitance. Electric breakdown was determined to have a local nature. There was a rapid initial increase in current change, followed by stabilization. The cause of increased breakdown was traced to the conentration of uranyl ions that brough a rapid increase in conductive faults in the membrane. Figures 5; references 5: 2 Russian, 3 English.
[111-12131]

FERTILIZERS

UDC 633.511 : 631.811.98

REGULATING COTTON GROWTH AND DEVELOPMENT WITH DIMETHYLMORPHOLINIUM CHLORIDE

Moscow KHIMIYA V SEL'SKOM KHOZYAYSTVE in Russian No 1, Jan 82 pp 35-36

ASROROV, K. A., RASULOV, S., candidates of biological sciences, and PROKOF'YEV, A. A., doctor of biological sciences, Department of General Cotton Genetics, TaSSR Academy of Sciences; and Institute of Plant Physiology, USSR Academy of Sciences

[Abstract] Studies were made of the effect of dimethylmorpholinium chloride on growth, development and fruit bearing of cotton on the No. 4 Sovkhoz, Yavanskiy Rayon, in the Kurgan-Tyube Oblast region of the Tajik SSR in 1977-1980. On a control plot, hand chopping was performed, while at about the same date in August the test plot was sprayed with growth regulator. Results showed that the compound totally prevented formation of later buds, and hastened boll formation by 15-20 days, resulting in 8-12% higher yields. No effect on cotton quality was noted. References 3 (Russian).
[119-12131]

UDC 630*863.1.002.3.004.4

EXPERIMENTAL LIQUID STORAGE OF NITROAMMOPHOS

Moscow GIDROLIZNAYA I LESOKHIMICHESKAYA PROMYSHLENNOST' in Russian No 1, 1982 (signed to press 18 Jan 82) p 20

VOLOKITIN, V. G., group manager, All-Union Scientific Production Association of the Paper-Cellulose Industry, TATARTSEV, S. S. and PERSHIN, V. I., engineers, Vyborg Paper-Cellulose Plant

[Abstract] Nitroammophos is a yeast nutrient salt containing phosphorus, nitrogen and potassium, and is used at the Vyborg Paper-Cellulose Plant to grow fodder yeasts which contain P, N and K. A liquid process was tested by the authors' laboratories to retain the K-containing salts, which have been subject to loss. A 25 m^3 volume of postfermentation mash is poured into a 40 m^3 vat then 25 tons of salt is added. The clarified solution

(19 m^3) is drawn off once every 1 to 2 days. In comparison with the older method, this new process reduces the losses of undissolved fertilizer with the slime. This process results in a savings of 19,000 rubles annually and may be recommended for introduction into the paper-cellulose, hydrolysis and microbiological industries.
[130-12027]

UDC 547.87 + 547.024

1,2,4-BENZOTHIAZINILES--NEW TYPE OF FREE RADICALS CONTAINING SULFUR AND NITROGEN

Leningrad ZHURNAL ORGANICHESKOY KHIMII in Russian Vol 17, No 12, Dec 81 (manuscript received 11 Jun 81) pp 2619-2620

MARKOVSKIY, L. N., TALANOV, V. S., POLUMBRIK, O. M. and SHERMOLOVICH, Yu. G., Institute of Organic Chemistry, UkSSR Academy of Sciences, Kiev

[Abstract] 1-Chloro-3-phenyl(trichloromethyl)-1,2,4-benzothiadiazines can be reduced with powdered Na in benzene or tetrahydrofurane (THF) to yield stabel free radicals--benzothiadiaziniles. The same radicals can be obtained by oxidation of 2H-1,2,4-benzothiadiazine with PbO_2 in presence of K_2CO_3. In benzene or THF, these free radicals are stable for days. Air oxygen appears to have no effect on them. These radicals appear to be of the π-electronic type: their stability is due to the delocalization of an unshared electron on the bivalent sulfur atom. References 8: 2 Russian, 6 Western.
[133-7813]

ION EXCHANGE PHENOMENA

PROSPECTS FOR PREPARING FIBROUS ION-EXCHANGE MATERIALS FOR GAS PURIFICATION TECHNOLOGY

Moscow KHIMICHESKAYA PROMYSHLENNOST' in Russian No 1, Jan 82 pp 22-24

ENNAN, A. A. and VLINDER, V. I.

[Abstract] As a result of new developments in their production, such as high surface reactivity and low drag, ion exchange materials are currently being considered for application in gas scrubbing units. Adsorption of gases, e.g., NH_3, HCl, HF and SO_2, is more rapid with ion-exchange fibers (cellulose, polyvinylalcohol, polypropylene, saponified polyacrylonitrile and carboxyl cationic resins) than with ion-exchange resins--due possibly to higher accessibility of functional groups. In all cases, the activity of the material toward the sorbate gas increases strongly with increasing moisture content. A single layer of adsorbent is not particularly efficient for removing contaminants in aerosol form; hence equations are developed to determine the required number of layers of adsorbent. The actual application of these or similar materials is contingent on the scrubbing efficiencies and economic effectiveness together with the technological sophistication of the gas scrubbing installation.
References 24 (Russian).
[129-12027]

UDC 543.544

USING RADIATION-RESISTANT RESINS TO SEPARATE RADIOACTIVE ELEMENTS BY DISPLACEMENT CHROMATOGRAPHY METHOD, PART 3: SEPARATION ON CATIONITES KU-4, KU-6 AND KU-160 WITH AID OF NITRYLOTRIACETIC ACID

Moscow ZHURNAL FIZICHESKOY KHIMII in Russian Vol 56, No 1, Jan 81 (manuscript received 11 Feb 81) pp 220-223

CHUVELEVA, E. A., FIRSOVA, L. A., KHARITONOV, O. V. and NAZAROV, P. P., Institute of Physical Chemistry, USSR Academy of Sciences, Moscow

[Abstract] Nitrylotriacetic acid, which is widely used to separate rare earth and trans-plutonium elements, was used to separate neodymium and

prazeodymium on KU-4, KU-6 and KU-160 cations in the zinc-form using a 0.1 mol/liter solution of NTA at about 70° C. This procedure was as effective as the widely used method with KU-2 cation, and had the advantage of avoiding the negative effect of using diethylenetriaminepentaacetic acid as the eluent. Figures 2; references 8: 6 Russian, 2 English.
[123-12131]

NITROGEN COMPOUNDS

UDC 546.431.4.577.743.1

REACTION OF PENTAMETHYLENEDIBROMIDE WITH SECONDARY AMINES, AND CERTAIN CONVERSIONS OF TETRADERIVATIVE AMMONIUM SALTS OBTAINED

Baku AZERBAYDZHANSKIY KHIMICHESKIY ZHURNAL in Russian No 3, 1981 (signed to press 15 Dec 81) pp 56-60

MOVSUMZADE, M. M., GURBANOV, P. A., METAKSA, I. P. and ASKEROV, N. D., Azerbaijan Petroleum and Chemistry Institute imeni M. A. Azizbekov

[Abstract] Pentamethyldibromide reacts with secondary amines to form corresponding quaternary ammonium salts. With dialkylamines, corresponding N,N-dialkylpiperidinium bromides were formed. With morpholine and piperidine, azospiro- compounds were obtained. Alkaline decomposition the quaternary ammonium salts yields piperidine derivatives. Both thermal and alkaline processes produce the same N-alkylpiperidines, except in the case of azo-spiro- compounds, where thermal separation does not take place, but alkaline separation results in an elimination reaction. References 9: 5 Russian, 4 Western.
[97-12131]

UDC 541.128

REDUCING MOLECULAR NITROGEN USING $Cr(OH)_2$--$Mo(OH)_3$ HYDROXIDE

Moscow KINETIKA I KATALIZ in Russian Vol 22, No 6, Nov-Dec 81 (manuscript received 9 Jul 80) pp 1401-1406

BURBO, Ye. M., DENISOV, N. T. and KOBELEVA, S. I., Department of the Institute of Chemical Physics, USSR Academy of Sciences, Chernogolovka

[Abstract] The chambers of a bichamber vessel were filled with a methanol solution containing Cr and Mo, and with water and a KOH solution in methanol. After injection of nitrogen and heating, the components were mixed and stirred at a controlled temperature. The kinetics of hydrazine reduction were studied in an argon medium, using spectrophotometry and

titration with an NH_4VO_3 solution. Products of the reaction contained about 5 times as much ammonia as hydrazine. Separate tests showed hydrazine reduction at 10 times the speed, using $Cr(OH)_2$--$Mo(OH)_3$, compared to use of chromium hydroxide alone. Increasing molybdenum in the system brought increased yields up to a maximum of 10% Mo(in association with Cr^{2+}). The kinetics of reducing agent consumption were the same in either an argon or nitrogen medium. It was determined that ammonia could be formed in hydroxide systems both through intermediate formation of hydrazine, and through an immediate, one-step reduction of nitrogen. Figures 5; references 10: 7 Russian, 3 English.
[98-12131]

UDC 542.942.7

KINETICS AND MECHANISM OF REDUCING NITROGEN IN $FeCl_3$+PhLi SYSTEM IN PRESENCE OF LITHIUM HALOGENIDES

Moscow KINETIKA I KATALIZ in Russian Vol 22, No 6, Nov-Dec 81 (manuscript received 9 Jul 80) pp 1457-1464

BAZHENOVA, T. A., GRYUZEL', M., LENY, G., SHILOV, A. Ye. and SHILOVA, A. K., Department of the Institute of Chemical Physics, USSR Academy of Sciences, Chernogolovka; National Center for Scientific Research, Paris, France

[Abstract] To test the hypothesis that the effect of salts in nitrogen reactions is associated with accelerated formation of active forms of iron, an anhydrous ferric chloride was combined with lithium phenyl which contained wither LiBr of LiI. The $FeCl_3$ in an ether solution was gradually added to the lithium compound at -20°C, with rapid stirring. After heating to 20°C, spectrophotometric and titration studies were made. A rapid color change evidenced an autocatalytic process in which lithium bromide decreased the period of induction and hastened the reaction. The catalyst was a rather stable product of the reaction. Accumulation of hydrazine in the presence of varying amounts of lithium idodide showed that the reaction speed and the salt concentration were directly related. Kinetic data show that the active particle in the reaction with molecular hydrogen is a complex of Fe(0). Figures 5; references 12: 8 Russian, 4 Western.
[98-12131]

UDC 547.873'787'781.07 : 542.952

REARRANGEMENTS IN HALOGENALKOXY(THIO,AMINO)-sym-TRIAZINES, PART 10: SYNTHESIS AND REARRANGEMENT OF 2-DIMETHYLAMINO-4-(2-ACYLHYDRAZINO)-6,7-DIHYDROOXAZOLO-[3,2-a]-sym-TRIAZINES

Riga KHIMIYA GETEROTSIKLICHESKIKH SOYEDINENIY in Russian No 12, Dec 81
(manuscript received 9 Dec 80) pp 1689-1692

DOVLATYAN, V. V., KHACHATRYAN, N. Kh., GOMKTSYAN, T. A. and SAAKYAN, S. M.,
Armenian Agricultural Institute, Yerevan

[Abstract] Continuing earlier studies, the authors examined the reaction of 2-dimethylamino-4-(2-chloroethoxy)-6-(2-acylhydrazino)-sym-triazine, which under thermolysis can form oxazolo-, imidazo-, and triazinotriazine. In the reaction of a quaternary salt with ethylene chlorhydrin in the presence of alkali at low temperature, dihydrooxazolo-sym-triazine was formed which, upon heating at 200°C, regrouped to form dihydroimidazo-sym-triazine. Details of the reactions which produced similar compounds are described in the experimental section. Proton magnetic resonance and mass-spectral analysis was used to confirm the products obtained. References 2 (Russian).
[101-12131]

UDC 547.781'821.07

UNUSUAL CASE OF IMIDAZO[4,5-s]PYRIDINE DERIVATIVE FORMATION

Riga KHIMIYA GETEROTSIKLICHESKIKH SOYEDINENIY in Russian No 12, Dec 81
(manuscript received 27 May 81) p 1695

YUTILOV, Yu. M. and SHCHERBINA, L. I., Institute of Physical Organic Chemistry and Carbon Chemistry, UkSSR Academy of Sciences, Donetsk

[Abstract] Heating 1-benzyl-3-amino-1,4-dihydropyridoneimine-4 with elementary sulfur at 150-160° C for 12 hours formed 2-phenylimidazo[4,5-s]-pyridine with a 35% yield. A 56% yield of imidazopyridine was also obtained at 250-260° C for 6 hours.
[101-12131]

ORGANOMETALLIC COMPOUNDS

UDC 546.666.185

STUDY OF ERBIUM HYPOPHOSPHATES

Moscow ZHURNAL NEORGANICHESKOY KHIMII in Russian Vol 27, No 1, Jan 82 (manuscript received 6 Apr 81) pp 81-84

MIRONOVA, V. S. and TANANAYEV, I. V., Institute of General and Inorganic Chemistry imeni N. S. Kurnakov, USSR Academy of Sciences

[Abstract] Mixtures were made with a 0.05 mol/liter concentration of erbium nitrate, and varying concentrations of either hypophosphoric acid or sodium hypophosphate. Solid phases thus obtained were filtered and washed in ice water, alcohol, and ether, then dried and analyzed. Erbium content was determined with a reverse titration method using zinc chloride in a urotropin buffer solution with a methylthymol blue indicator. Results showed that all mixtures containing hypophosphoric acid formed a crystalline erbium hypophosphate with the composition $ErHP_2O_6 \cdot 4H_2O$. Various neutral and mixed erbium hypophosphates were obtained when sodium hypophosphate was used, depending on its concentration. Neutral erbium hypophosphates were in amorphous forms, while mixed ones were crystalline. A thermographic method uas used to determine heat resistance of the compounds. X-ray-phase analysis showed that the hypophosphate anion broke down into P^{III} and P^{V} at temperatures between 300 and 600° C, with resultant oxidation and formation of a pyrophosphate anion. Heating for 2 hours at 800° C, and subsequent chromatography, showed spots of ortho-, pyro- and polyphosphates anions of erbium. Figures 3; references 7: 3 Russian, 4 Western.
[114-12131]

UDC 541.128

QUANTUM CHEMICAL STUDY OF REACTIONS CATALYZED BY METAL COMPLEXES, PART 4: REACTION OF PHOSPHINE COMPLEXES PdL_n, Pd_2L_2 and PtL_2 WITH HYDROGEN

Moscow KINETIKA I KATALIZ in Russian Vol 22, No 6, Nov-Dec 81 (manuscript received 10 Nov 80) pp 1431-1437

GRITSENKO, O. V., BAGATUR'YANTS, A. A., MOISEYEV, I. I. and KALECHITS, I. V., Institute of Organic Chemistry imeni N. D. Zelinskiy, USSR Academy of Sciences; Institute of General and Inorganic Chemistry imeni N. S. Kurnakov, USSR Academy of Sciences, Moscow

[Abstract] Quantum chemical study was made of the reaction of H_2 with palladium complexes containing a binuclear Pd--Pd bond; they were compared to tests of mononuclear palladium compounds, which do not react with H_2, and with platinum complexes where a dissociative bond with H_2 occurs. Calculations based on a linear model focussed on the complexes Pd_2L_2, ML_n and Pd_2L_2 with molecular hydrogen, and dihydride complexes H_2ML_n and $H_2Pd_2L_2$. The first was regarded to have a low-energy Pd--Pd bond in a linear molecule, indicating an associative nature. In the second, binuclear phosphine complexes of Pd(0) had more in common with molecular hydrogen than analogous mononuclear complex of Pd(0) and Pt(0). Polynuclear Pd compounds brought increased numbers of Pd atoms in the cluster that would lead to situations in which the H atom could react with several Pd atoms at the same time. Figures 2; references 9: 5 Russian, 4 English. [98-12131]

UDC 547.269

REACTION OF ARACYL- AND CARBOALKOXYMETHYLSELENONIUM SALTS WITH NUCLEOPHILIC REAGENTS

Leningrad ZHURNAL ORGANICHESKOY KHIMII in Russian Vol 17, No 12, Dec 81 (manuscript received 2 Mar 81) pp 2552-2558

MAGDESIYEVA, N. N., KYANDZHETSIAN, R. A., KIRPICHENOK, M. A. and CHOBNIKOVA, N. G., Moscow State University imeni M. V. Lomonosov

[Abstract] Reactions of $R_2Se^+CH_2CORX^-$ (I) type salts with tertiary amines, substituted hydrazines and triphenylphosphine were studied. Under mild conditions triethylamine demethylated I yielding α-methylselenocarbonyl compounds. The reaction rate depended primarily on the anion X, while the yield of methylselenocarbonyl compounds was related to the substituent $R(R^1$ or $R^2)$. Evaluating the effect of the structure of α-carbonyl substituted selenonium salts on their reactions with nucleophilic compounds, synthesis of diethyl- and methylphenylselenonium salts was attempted by reacting respective selenides with ethylbromoacetate and phenacyl bromide.

However, in place of the expected selenonium salts, the products were α-ethylseleno- and α-phenylselenocarbonyl compounds formed evidently from the originally expected salts. This reaction could be used as a preparative method for α-selenated ketones and complex ethers. It was shown that triethylamine splits α-carbonyl substituted dimethylselenonium salts preferentially at the Se-methyl bond; triphenylphosphine is capable of splitting them at either the Se-methyl or Se-CH_2COPh bond, the latter being the preferred site. References 19: 8 Russian (1 by Western author), 11 Western.
[133-7813]

UDC 546.4/9:547.491.5

METAL SELENOCYANATES

Moscow USPEKHI KHIMII in Russian Vol 51, No 1, Jan 82 pp 40-56

SKOPENKO, V. V., TSINTSADZE, G. V. and IVANOVA, Ye. I., Georgian Polytechnic Institute imeni V. I. Lenin, Tbilisi

[Abstract] The 1970-1979 literature which deals with metal-SeCN compounds is reviewed. Stability constants for complexes of Se with such metals as Hg, Cd, Zn, Co, Tl, In, V and others are given for a variety of solvents, for example water, acetone, dimethylformamide, dimethylsulfoxide and CH_3CN. The solvent exerts a significant effect; the complexes are most stable in acetone. The presence of ligands containing donor-acceptor N atoms, such as amines, also strongly increases the compound stability. Compounds such as $K[CuR_2SeCN]$, where R = pyridin-2-carbonic acid, have been synthesized. In this case, the SeCN-group is bonded by weak bonds to the Cu through Se. Complexes containing two or more types of ligands have also been prepared. The structures, bonding energies, and configurations of both types of compounds have been evaluated with various types of NMR, ESR, IR and other techniques. Consideration is also given to structures containing an SeCN group and a metal-phosphorus or metal-carbon bond. References 156: 74 Russian, 82 Western.
[127-12027]

ORGANOPHOSPHORUS COMPOUNDS

UDC 542.91 + 547.1.118

SYNTHESIS OF CERTAIN FIVE-MEMBERED CYCLIC PHOSPHORUS DERIVATIVES

Baku AZERBAYDZHANSKIY KHIMICHESKIY ZHURNAL in Russian No 3, 1981
(signed to press 15 Dec 81) pp 41-45

GADZHIYEV, G. Yu., ALEKPEROV, G. I. and PUDOVIK, M. A., Kirovabad State Pedagogical Institute imeni G. Zardabi; Institute of Organic and Physical Chemistry imeni A. Ye. Arbuzov, Kazan'

[Abstract] 2-Alkylhydrazonoformylphenols were reacted with dioxy-, oxaza- and diaza-phospholanes which have a diethylamino group on the phosphorus that accounts for their high phosphorylizing activity. Despite the presence of several functional groups in the hydrazone molecule, the reactions were selective at the hydroxyl group, with formation of diethylamine. The structure and composition of the compounds derived was determined by element analysis and infrared and nuclear magnetic resonance spectroscopy of ^{1}H and ^{31}P. Two new derivatives of phosphorus were obtained: 2-dimethylamino-2-thioxo-3-phenyl-1,3,2,-oxazophospholane, and 2-diethylamino-3-phenyl-1,3,4,2-oxadiazaphospholene-4. References 11: 4 Russian, 7 English. [97-12131]

UDC 548.737

STRUCTURE OF ORGANOPHOSPHORUS COMPOUNDS, PART 21: X-RAY STRUCTURE AND SPECTRAL ANALYSIS OF 1-TRIPHENYLPHOSPHAZO-1-DIMETHYLAMINO-2,2-DICYANOETHYLENE

Novosibirsk ZHURNAL STRUKTURNOY KHIMII in Russian Vol 22, No 6, Nov-Dec 81 (manuscript received 18 Jun 80) pp 117-123

ANTIPIN, M. Yu., POLISHCHUK, A. P., STRUCHKOV, Yu. T., YEGOROV, Yu. P., YURCHENKO, V. M., DIDKOVSKIY, V. Ye. and YATSISHIN, A. A., Institute of Heteroorganic Compounds, USSR Academy of Sciences

[Abstract] X-ray structural comparison was made of 1-triphenylphosphazo-1-dimethylamino-2,2-dicyanoethylene and 1-triphenylphosphazo-1-chloro-2,2-dicyanoethylene and the results were compared with respect to infra-red and

ultra-violet spectra, and quantum-chemical calculations. A distortion in structure was found that was related to presence of the dimethylamino group. A weakening of double bonds was caused, apparently, by delocalization of electron density in the molecules. Where a phosphazo-group partially left the compound, it was frequently replaced by the NMe_2-group. Comparison of ultra-violet spectra of similar molecules with Ph_3P grouping, with the spectra of these compounds, show the effect on the electron system of aromatic ring to be insignificant. In related dicyanoethylenes where the phosphazo-group is replaced by an amino-group, the S_0-S_1 shift is observed in a shorter wave-length area, and is more intensive. Figures 3; references 15: 7 Russian, 8 Western.
[109-12131]

UDC 547.245'.241 + 547.953.1

SYNTHESIS OF BISPHOSPHATIDE ACID DERIVATIVES AND THEIR THIO-ANALOGUES

Leningrad ZHURNAL ORGANICHESKOY KHIMII in Russian Vol 17, No 12, Dec 81 (manuscript received 9 Feb 81) pp 2524-2533

PREDVODITELEV, D. A., CHUKBAR, T. G., MALENKOVSKAYA, M. A., RASADKINA, Ye. N. and NIFANT'YEV, E. Ye., Moscow State Pedagogical Institute imeni V. I. Lenin

[Abstract] Synthesis of thio- and dithio analogues of bisphosphatide acids is reported based on easily accessible secondary and tertiary phosphites of 1,2-σ-isopropylideneglycerine. The products were ketals of diglycerophosphates, diglycerothio- and dithiophosphates. Individual products were identified by means of TLC and NMR spectroscopy. Acylation of these ketals was studied leading to the formation of previously unknown bisphosphatide acids and their thio- and dithio analogues. References 21: 14 Russian, 7 Western.
[133-7813]

UDC 547.241

INTERACTION OF PHOSPHORUS PENTACHLORIDE WITH 4-ETHOXY-1-BUTENE

Ivanova IZVESTIYA VYSSHIKH UCHEBNYKH ZAVEDENIY: KHIMIYA I KHIMICHESKAYA TEKHNOLOGIYA in Russian Vol 24, No 12, Dec 81 (manuscript received 17 Oct 80) pp 1570-1571

KORMACHEV, V. V. and MITRASOV, Yu. N., Department of Organic Chemistry, Chuvash State University imeni I. N. Ul'yanov

[Abstract] Phosphorus pentachloride and 4-ethoxy-1-butene were combined at room temperature in an absolute benzene medium, and the pure white adduct

was then treated with sulfur dioxide. Infra-red, nuclear magnetic resonance of ^{1}N and ^{31}P spectroscopy and element analysis of the vacuum distilled product showed a structure like that of dichloranhydride-2-chloro-4-ethoxybutyl phosphonic acid. The procedure is described in an experimental section. Reference 1 (Russian).
[122-12131]

UDC 661.185.233

SYNTHESIZING QUATERNARY PHOSPHONIUM SALTS WITH LINKED DIENE GROUPS

Yerevan ARMYANSKIY KHIMICHESKIY ZHURNAL in Russian Vol 36, No 12, Dec 81 (manuscript received 29 Jul 81) pp 995-1000

LULUKYAN, R. K., OVAKIMYAN, M. Zh. and INDZHIKYAN, M. G., Institute of Organic Chemistry, Armenian SSR Academy of Sciences, Yerevan

[Abstract] The behavior of butadiene-1,4-dibromo-2-butene dibromide toward tertiary phosphines was studied, showing that the latter's reaction with triphenyl- and tributylphosphines in ether led to formation of a mixture of monophosphonium salts with a double bond at the alpha-beta and beta-gamma positions to the phosphorus. Upon heating the mixture to 100° C in dimethylformamide, pure compounds with an alpha-beta unsaturated bond was formed. Synthesis of linked dienephosphonic salts, from quaternary phosphonium salts with a delta bromine atom, was achieved by reaction with triethylamine in chloroform solution. The melting temperature in the mixture was depressed. Thin layer chromatography was used to determine purity and infra-red spectroscopy to establish structure. Details of the reactions are presented in an experimental section. References 4: 3 Russian, 1 Western.
[124-12131]

UDC 547.221:547.241

FLUOROPHOSPHORYLIDES

Moscow USPEKHI KHIMII in Russian Vol 51, No 1, Jan 82 pp 3-22

TYULENEVA, V. V., ROKHLIN, Ye. M. and KNUNYANTS, I. L., Institute of Heteroorganic Compounds, USSR Academy of Sciences, Moscow

[Abstract] A description is presented of the syntheses and properties of phosphorylides containing fluorine (F) in the "alkylidene" moiety. Excluded from consideration are fluoromethylenephosphoranes and thos phosphorylides in which F is located some distance from the carbanionic center. Four types of syntheses are considered: reaction of P(III) with fluoro-olefins or other organofluoride compound such as α-bromopentafluoroacetophenone and

2,2,2-trifluoroethyliodide; reaction of P(V) phosphorylides with various fluorine compounds; reactions of alkylphosphonic acid ethers, such as the Wittig-Koerner reaction. The stability of these compounds reflects the physical and physico-chemical properties. Ylides of the type $R_3P=C(CF_3)$ containing the trifluoromethyl group are particularly stable. Infrared and mass spectrometry plus ^1H, ^{19}F and ^{31}P NMR have been used to elucidate the structural and geometric configurations. The stability of these compounds also influences their reactivity toward reagents such as strong and weak acids, water ethylamine, gaseous halogens, and others. References 87: 28 Russian, 59 Western.
[127-12027]

PESTICIDES

UDC 678.067.7.019.34 678.019.34

CHEMICAL STABILITY OF CARBON-GLASS FIBER PLASTIC IN PRODUCTION OF PHTHALOPHOS PESTICIDE

Moscow KHIMICHESKOYE I NEFTYANOYE MASHINOSTROYENIYE in Russian No 10, Oct 81 p 40

MIKHAYLOV, V. S., candidate of chemical sciences, DREYTSER, V. I., candidate of technical sciences, YURKOVA, I. A., KOZHEVNIKOVA, N. M., TAMAYEVA, L. V. and BELYAYEV, A. D., engineers

[Abstract] Test samples of carbon-glass fiber plastic, in the form of 50 x 30 mm discs and 50 mm tubes with 68 mm inside diameter and 98 mm outside diameter, were made of a carbon cloth, phenol tar and silicon compounds. A heat-hardening epoxy was the bond. After heat treating, the samples were subjected to petroleum solvents and formaldehyde, which are used in phthalophos production. The 15-18% change in durability for the samples was regarded as favorable in comparison to other materials that have been used. Two years of actual industrial use have confirmed these findings. Figure 1; references 4 (Russian).
[96-12131]

UDC 632.95.025.8

INSECTICIDE RESISTANCE OF HARMFUL SPECIES OF LEPIDOPTERA (ANALYTICAL SURVEY)

Moscow KHIMIYA V SEL'SKOM KHOZYAYSTVE in Russian No 1, Jan 82 pp 18-21

ROSLAVTSEVA, S. A., doctor of biological sciences, All-Union Scientific Research Institute for Chemical Plant Protection Substances

[Abstract] The article surveys development of resistance to insecticides in certain species of Lepidoptera, such as Chloridea obsoleta and Heliothis armigera, which are serious pests of cotton and tomatoes in the Soviet Union. Resistance to DDT and the impact of the ban on it are discussed for these and other pests in the USA and the USSR. The picture in other areas of the

world is cited as well. DDT effectiveness declined from 90% in 1963 to 40-50% in 1973 in Tajikistan. The cabbage butterfly Pieris rapae was found to have developed resistance to chloroorganic compounds in Leningrad Oblast, while the grape leaf roller moth Polychrosis botrana survives DDT and lindane in the Ararat valley, and the codling moth is resistant in Moldavia. Successful battle against these pests is tied to scientific application of a variety of insecticides in succession, based on study of genetics. References 52: 18 Russian, 34 English.
[119-12131]

UDC 632.95.025.8

RESISTANCE OF GREENHOUSE WHITEFLY TO INSECTICIDES (ANALYTICAL SURVEY)

Moscow KHIMIYA V SEL'SKOM KHOZYAYSTVE in Russian No 1, Jan 82 pp 24-27

ABRAMOVA, T. L., All-Union Scientific Research Institute for Plant Pathology

[Abstract] The effects of various organophosphorus insecticides on the greenhouse whitefly Trialeurodes vaporaricum Westw. in various developmental stages was studied. Such compounds were initially very effective, but beginning in the early 1970s reports of reduced mortality began to appear. In 1975 this resistance was recorded in the Moscow, Leningrad and Kiev regions and in Moldavia, and soon from other regions as well. Laboratory tests showed that Malathion resistance reached 244 times original sensitivity by the 11th generation. The imago showed mush less resistance to other compounds: 26.4 to Basudin, 22.2 to DDVF, 79.5 to Ethaphos, etc. Other insecticides aimed specifically at eggs, pupas, imagos and adults are recommended, including Carbophos, Actellic and various synthetic pyrethroids and pyrethrins. Several growth regulators are also recommended, including Kinoprene, Triirene and others. References 38: 14 Russian, 10 Eastern European, 14 English.
[119-12131]

UDC 632.954 : 633.181

HERBICIDE MIXTURES ON RICE FIELDS

Moscow KHIMIYA V SEL'SKOM KHOZYAYSTVE in Russian No 1, Jan 82 pp 32-35

AGARKOV, V. D., CHANUKVADZE, R. G., candidates of agricultural sciences, and RUDENKO, P. P., All-Union Scientific Research Institute of Rice

[Abstract] Studies were made in 1977-1980 in field test plots and production operations to determine optimal mixtures of Basagran, Ronstar, Propanid,

Ordram and Saturn herbicides in eliminating weed infestations while preserving the highest possible rice yields. Mixtures included both laboratory and manufactured herbicides. The cost of a Propanid-Saturn mix was covered by the supplementary yield with additional income. Ronstar was found to be less harmful to warm-blooded animals than other compounds tested. With careful irrigation Propanid mixed with Ordram, Saturn or Ronstar had no effect on the rice stands, and no residues were found in the grain. Basagran and an amino salt [2,4-D(2,4-DA) or 2M-4X] proved effective against reed tubers, while Propanid and Ordram, Saturn or Ronstar controlled echinocloa. References 4 (Russian).
[119-12131]

UDC 615.281:547.743.1.012.1

SYNTHESIS AND ANTIMICROBIAL ACTIVITY OF SOME N-SUBSTITUTED PYRROLIDONE AND PYRROLIDINE DERIVATIVES

Moscow KHIMIKO-FARMATSEVTICHESKIY ZHURNAL in Russian Vol 16, No 1, Jan 82 (manuscript received 26 May 81) pp 54-58

SEDAVKINA, V. A., MOROZOVA, N. A., CHULKOV, V. F. and KULIKOVA, L. K., Saratov University imeni N. G. Chernyshevskiy

[Abstract] In an earlier study it was shown that 2-alkyl-1-(hydroxyalkyl)-pyrrolidines exhibit anitmicrobial activity. In continuation of these studies, novel N-substituted derivatives of pyrrolidone and pyrrolidine were obtained containing fragments of carbamic and sulfanilic acids. Starting 5-alkylpyrrolidones, 5-alkyl-1-(hydroxyalkyl)-2-pyrrolidones and 2-alkyl-1-(hydroxyalkyl)pyrrolidines (I) were obtained by published methods. When I was reacted with benzylisocyanate in toluene, pyrrolidinol carbamates were obtained. Reaction of pyrrolidones and pyrrolidines unsubstituted at the nitrogen atom gave products in which the carbaminic acid radical was directly connected with the heterocycle [for example, 5-propyl-N-(butylcarbamoyl)-2-pyrrolidone]. All compounds obtained exhibited antimicrobial activity when tested against: St. aureus 209 P, E. coli M-17, Pr. vulgaris 30, Ps. aeruginosa 165, C. albicans 45. The most active compounds were derivatives of N-(β-hydroxyethyl)-2-pyrrolidone and N-(β-hydroxyethyl)-pyrrolidine. References 4 (Russian).
[136-7813]

UDC 615.28:547.558.1

ANTIMICROBIAL ACTIVITY OF AZOMETINE AND STILBENE PHOSPHONIUM ANALOGUES

Moscow KHIMIKO-FARMATSEVTICHESKIY ZHURNAL in Russian Vol 16, No 1, Jan 82
(manuscript received 28 Apr 81) pp 67-70

PATRATIY, V. K., SHEVCHUK, M. I., SIDORCHUK, I. I., BUKACHUK, O. M. and PRODANCHUK, N. G., University of Chernovtsy, Chernovtsy Medical Institute

[Abstract] The goal of the present sutdy was to develop novel antimicrobial preparations containing phosphorus. A series of tetraaryl phosphonium salts was synthesized: phosphonium azomethines, bis-phosphonium azomethines and phosphonium stilbenes. Their antimicrobial properties were tested against: Staph. aureus 209, B. anthracoides 297, Esch. coli, Proteus vulgaris, Salm. typhimurium, Kl. Shynoseleromatis, Strept. viridens and Cand. albicans. All synthesized compounds showed some antimicrobial activity which appeared to be more pronounced against gram positive bacteria than against gram negative ones. The least reactive were: bis-phosphonium azomethine, phosphonium styrene and furyl phosphonium stilbene.
References 5 (Russian).
[136-7813]

UDC 541(64 + 183.12)

COPOLYMERIZATION OF DIALKYL ESTERS OF VINYLPHOSPHONIC ACID WITH ACRYLIC ACID

Baku AZERBAYDZHANSKIY KHIMICHESKIY ZHURNAL in Russian No 3, 1981
(signed to press 15 Dec 81) pp 73-76

SIDORCHUK, I. I., ABBASOVA, B. G. and EFENDIYEV, A. A.

[Abstract] Studies were made of copolymerization of vinylphosphonic acid diethyl, dibutyl and diisobutyl esters with acrylic acid to determine the nature of certain principles of the processes. Copolymerization was conducted under 10^{-4} vacuum in quartz ampules in the presence of 1% hydrogen peroxide of isopropylbenzene, with a mercury-quartz lamp used to stimulate the reaction with ultra-violet light. The copolymers obtained were dissolved in ethanol, precipitated with diethyl ether and dried under vacuum at 35-40° C. Assay of phosphorus and carboxyl content showed the dependence of linking of the monomers involved on the length and branching of the alkyl radical. References 12: 9 Russian, 3 English.
[97-12131]

UDC 678.674 + 678.85

POLYETHYLENETEREPHTHALATE CONTAINING PHOSPHORUS

Alma-Ata IZVESTIYA AKADEMII NAUK KAZAKHSKOY SSR: SERIYA KHIMICHESKAYA in Russian No 6, Nov-Dec 81 pp 73-80

BORISOV, G., TROYEV, T. and GROZEVA, At., Central Polymer Laboratory, Bulgarian Academy of Sciences

[Abstract] The effects of trans-esterification, polycondensation and side reactions were studied for polyethyleneterephthalate with diethylphosphite, a sodium salt of diethylphosphite, and a bisodium salt of 1,2-dicarbomethoxyethylphosphonic acid as modifiers. For the purposes of increasing fire resistance, diethylphosphite was determined to be unsuitable as a comonomer

for polyethyleneterephthalate. The other two modifiers gave increased fire resistance properties to the compound; the comonomer of bisodium salt provided a greater flame-retardant effect. Figures 8; references 28: 4 Russian, 24 Western.
[99-12131]

UDC 541.64 : 678.742

TEMPERATURE DEPENDENCY OF PROPERTIES OF COMPOSITIONS OF POLYETHYLENE AND PERLITE

Moscow VYSOKOMOLEKULARNYYE SOYEDINENIYA in Russian Vol 24, No 1, Jan 82 (manuscript received 9 Oct 80) pp 149-154

GEVORGYAN, M. A., SEL'SKAYA, O. G., NOVOKSHONOVA, L. A. and SIVERGIN, Yu. M., Institute of Chemical Physics, USSR Academy of Sciences

[Abstract] High density polyethylene with 88% expanded perlite by weight was compared to high density polyethylene mixed with untreated perlite. The compounds were used to make pellets, which were tested for deformation resistance. Thermogravimetric analysis showed that, when heated in air, the polyethylene underwent more rapid thermooxidation than did pure high density polyethylene. Data indicate that the composition materials containing high density polyethylene and perlite that had been specially treated had a durability in the temperature of 298-380K, superior to that of composites filled with untreated perlite. Figures 5; references 9 (Russian).
[104-12131]

UDC 678.746.22.049.91 : 547.595.2

NITROGEN-CONTAINING ANTIPYRENES FOR PRODUCING POLYMERS WITH REDUCED COMBUSTIBILITY

Moscow PLASTICHESKIYE MASSY in Russian No 1, Jan 82 p 58

CHIRKINA, G. D., NARKEVICH, L. M., SALAKHOV, M. S., KARLIK, V. M., GRISHKO, N. I., PONKRASHKINA, N. D., NAGIYEV, V. A. and ZAGRANICHNYY, V. I.

[Abstract] Diallylisocyanurate tetrabromide and triallylisocyanurate hexabromide (II) were synthesized, then verified by infra-red spectroscopy and element analysis. Also synthesized were N,N'-(n-phenylene)-bisimide isomethyltetrahydrophthalic acid (with melting point of 236-234° C) and the corresponding tetrabromide (with melting point of 204-210° C) for the first time. Polystyrene with lowered combustibility was prepared with the new antipyrenes by the block-suspension method. This polystyrene had better physicochemical properties than the industrially-produced polystyrene

modified with tetrabromoparaxylene. The new product had higher viscosity and reduced swelling. Addition of phosphate permitted use of less amounts of the tested compounds, which were non-toxic, non-combustible and explosion-proof. Dialkylisocyanurate tetrabromide and compound II above were also found to give fire resistance to penopolyurethane while preserving its elasticity. References 4 (Russian).
[118-12131]

UDC 678.742.3-134.22.02 : (66-934 + 66,933)

PROPERTIES OF PROPYLENE-ETHYLENE BLOCK-COPOLYMERS OBTAINED ON PERIODIC ACTION AND SEMICONTINUOUS ACTION EQUIPMENT

Moscow PLASTICHESKIYE MASSY in Russian No 1, Jan 82 pp 60-61

POPOV, V. P., BELOZEROV, V. V. and KUZNETSOVA, N. V.

[Abstract] Block-copolymers of propylene and ethylene were produced following a periodic procedure where, after proplyene polymerization, the pressure in the reactor was reduced and ethylene introduced. The content of ethylene chains in the block copolymer produced was determined by infrared spectroscopy to be less, and the cold resistance greater, than when semicontinuous processes were used. Figure 1; references 7: 5 Russian, 2 English.
[118-12131]

UDC 547.68:542.943

REACTIVITY OF SOME CONDENSED AROMATIC HYDROCARBONS DURING RADIATION OXIDATION IN AQUEOUS SOLUTIONS

Leningrad ZHURNAL ORGANICHESKOY KHIMII in Russian Vol 17, No 12, Dec 81 (manuscript received 24 Sep 80) pp 2547-2552

VYSOTSKAYA, N. A., BORTUN, L. N. and REKASHEVA, A. F., Institute of Physical Chemistry imeni L. V. Pisarzhevskiy, Kiev

[Abstract] Results have been reported of a study of the reactivity of condensed aromatic hydrocarbons under conditions of stationary γ-radiolysis in aqueous solutions relating it to the number of aromatic rings in the system. Following compounds were studied: naphthalene, phenanthrene, chrysene and 3,4-benz-pyrene; the effect of substituents was evaluated on β-substituted naphthalenes. It was shown that electron donor substituents accelerated the reaction while electron acceptors tended to retard it. A two orders of magnitude difference was noted between the reactivity of CH_3- and -COOH substituted compounds. The reaction rate constants increased with the number of aromatic rings in the system. It was shown that there is good correlation between the relative reaction rate constants K_{rel} and σ^+-Hammett constants. It was concluded that the reactivity is related to electronic characteristics and the structure of the transition complex because of the fact that the rate-determining step occurred after the stage of the single electron transfer. Figures 2; references 16: 8 Russian (2 by Western authors), 8 Western.
[133-7813]

UDC 546.296:546.04

CURRENT STATE OF RADON CHEMISTRY

Moscow USPEKHI KHIMII in Russian Vol 51, No 1, Jan 82 pp 23-39

AVRORIN, V. V., KRASIKOVA, R. N., NEFEDOV, V. D. and TOROPOVA, M. A., Leningrad State University

[Abstract] This article summarizes the data available prior to May 1980 on the physical, chemical and radioactive properties of radon. Tables include a list of the known isotopes together with the half-lives, types of emitted radiation and daughter products and a list of the inert gases Rn, Xe, Kr, Ar and Ne together with the hydrate stability, ionization potential, ionic character of bonding, dissociation energy, electronegativity and others. Experimental difficulties of working with radon, such as its short half-life and its fugitive nature, are mentioned. The compound RnF_2 can be prepared from several different fluorinating reagents such as ClF_3, KrF_3, BrF_3, K_2NiF_6 in HF and others. Until now it has not been possible to prepare organic compounds of inert gases using classical techniques. Noble gas compounds may also be prepared via radiochemical techniques. Some applications of radon compounds, such as in decontamination of reactor and mine effluents, are discussed. References 121: 45 Russian, 76 Western. [127-12027]

RUBBER AND ELASTOMERS

UDC 678.01.543.42

INFRA-RED SPECTRAL STUDY OF GRAFT COPOLYMERS BASED ON ACRYLONITRILE AND ETHYLENE-PROPYLENE RUBBER

Baku AZERBAYDZHANSKIY KHIMICHESKIY ZHURNAL in Russian No 3, 1981
(signed to press 15 Dec 81) pp 87-90

BUNIYAT-ZADE, A. A., KAKHRAMANOV, N. T., ANNAGIYEV, M. Kh.,
DOROZHKINA, R. I., KAKHRAMANOVA, Kh. T. and SHCHARINSKIY, Ye. A.,
All-Union Scientific Research Institute of Olefins; Institute of
Inorganic and Physical Chemistry, AzSSR Academy of Sciences

[Abstract] The authors' previously described infra-red spectroscopic method for determining quantities of bound acrylonitrile in polyethylene, polypropylene and polybutene is here adapted to analyze the triple copolymer ethylene-propylene rubber and ethylidennorbornene. Prior to spectral analysis, the grafted copolymers were cleaned with dimethylformamide to remove traces of polyacrylonitrile. Then measurements were made of optical density at analytical absorption bands of 2246 and 4310 cm^{-1}. The procedures permitted construction of a calibrated graph of the function $C = \underline{f}(D)$, and formulas were derived for quantitative assay of grafted components in weight and molecular units. References 4 (Russian).
[97-12131]

UDC 541.64 : 539.3

FEATURES OF DEFORMATION-RESISTANCE OF BUTADIENE-STYRENE BLOCK COPOLYMERS DURING UNIAXIAL STRETCHING

Moscow VYSOKOMOLEKULYARNYYE SOYEDINENIYA in Russian Vol 24, No 1, Jan 82
(manuscript received 26 Aug 80) pp 77-83

VINOGRADOV, G. V., KURBANALIYEV, M. K., DREVAL', V. Ye. and
BORISENKOVA, Ye. K., Institute of Petrochemical Synthesis
imeni A. V. Topchiyev, USSR Academy of Sciences; Tajik State University
imeni V. I. Lenin

[Abstract] Thermoelastoplasts were studied under various uniaxial deformation conditions in broad speed and tension ranges in relation to temperature

and the manner of material forming at temperatures below glass point. The tested material was Shell's "Cariflex TR-1102," a butadiene-styrene block copolymer. It was extruded or molded from solutions containing toluene, cyclohexane or dioxane. The nature of tension from deformation was related to speed of deformation and temperature. Results showed that below the glass point, the block polymer underwent irreversible flow deformation, depending on the degree of deformation and the temperature. Viscosity declined under extreme tension. An important feature of vulcanized elastomers was the fracture envelope, which determined the strain and tension fracture point. On the one hand the copolymer behaved like a vulcanized elastomer in a wide range of temperatures and deformations, although at times it behaved as a single-phase elastomer. Yet under certain conditions the butadiene-styrene block copolymer showed features typical of structured multi-phase systems. Figures 5; references 23: 10 Russian, 13 Western (several by authors).
[104-12131]

UDC 678.063.01; 539.43.001.5

EFFECT OF FILLER LEVEL AND POLYMER TYPE ON FATIGUE RESISTANCE OF RUBBERS

Moscow KAUCHUK I REZINA in Russian No 1, Jan 82
(manuscript received 25 Mar 81) pp 16-19

KHROMOV, M. K., Scientific Research Institute of the Tire Industry

[Abstract] Assuming that the model for rubber fatigue resistance was subjected to conditions where the material's structure did not regenerate, calculations were made to determine optimal filler levels and polymer type under deformation and the development of dispersed defects. Where the material endures strain in a non-linear curve, only deformation energy need be considered as a feature of the strained state of the body and its reaction to outside forces. Chemically unstable elastomers were found to fail in relation to the activity of oxygen in the inter-phase adsorption layer. Oxygen quantities decreased with temperature increases and decreases in partial oxygen pressure in the environment. The coefficient of rubber fatigue was calculated in relation to various fillers for butadiene-styrene, natural and "stereo-regular" isoprene rubbers. It was concluded that the degree of damage of composite materials depends on the proportions of various rubber types in the mixture. A formula was developed to reflect fatigue resistance of various rubbers when subjected to mechanical forces of varying intensity, with heat as an additional important factor. Figures 2; references 7 (Russian).
[125-12131]

UDC 678.043.93

REACTION OF EPOXY RESINS WITH NON-POLAR RUBBERS

Moscow KAUCHUK I REZINA in Russian No 1, Jan 82
(manuscript received 7 May 81) pp 20-23

ONISHCHENKO, Z. V., ZORINA, V. B., ZAMKOVAYA, V. V. and KUTYANINA, V. S., Dnepropetrovsk Chemical Technological Institute imeni F. E. Dzerzhinskiy

[Abstract] Special purpose rubbers such as chloroprenes, methylvinylpyridines and carboxylates were studied by infra-red spectroscopy and potentiometric titration to determine changes in epoxy group content in rubber-resin compositions. Since production rubbers contain stablilizers, they were removed by acetone extraction followed by triple precipitation of benzene solutions with ethanol. The type of mixing equipment used in production was found to determine the intensity of epoxy group disbursement; rolling caused more intensive mechanical activation and led to the formation of more polymer radicals than occurred with mixing processes. Injection of epoxy resins during mixing appeared to bring breakdown of the rubber during this operation. Increased length and heating temperature, followed by longer curing, contributed to better bonds of the epoxy resin to rubbers. Better durability and fatigue resistance also followed these changes in processing. Figures 4; references 11 (Russian).
[125-12131]

UDC 678.84.063.019.391 : 678.046

EFFECT OF AEROSIL CONTENT ON RUBBERS BASED ON SILOXANE DURING OPEN AIR CURING

Moscow KAUCHUK I REZINA in Russian No 1, Jan 82
(manuscript received 14 Oct 80) pp 23-26

GOLDOVSKIY, Ye. A., CHUBAROVA, G. V. and DONTSOV, A. A., Scientific Research Institute of the Rubber Industry

[Abstract] Vulcanized dicumylperoxide rubbers based on dimethylmethylvinylsiloxane with a redoxide heat stabilizer and much more age-resistant dimethyldiphenylmethyl vinylsiloxane with an iron oxide stabilizer were studied in terms of various degrees of filling, aging temperatures and rubber types. A period of rapid destructive changes and a slower process of relative stretching were identified, and the remaining findings were divided into these sub-categories. Increased amounts of silica powder reduced cross-linking during rapid aging in the first rubber, with increased sol fractions. During relatively slow aging this relation was reversed. Thus, aerosil reduces oxidation during rapid aging, while during slower aging its effect is tied to destructive processes in the vulcanizer matrix and cross-linking of polymer chains. Stretch was found to increase during

slower aging as aerosil levels were increased, while stretch decreased during rapid aging. These experimental results were related to practical applications where aging time is figured in hours or days at minimum. At temperatures higher than 300° C, it is necessary to employ heat stabilizers that will permit reduction of aerosil filler quantities. Figures 5; references 3 (Russian).
[125-12131]

UDC 678.84.063.01 : 541.6 : 678.048

HEAT STABILIZATION OF RUBBERS BASED ON SILOXANES USING AEGIRITE CONCENTRATE

Moscow KAUCHUK I REZINA in Russian No 1, Jan 82
(manuscript received 25 Jun 81) pp 26-28

KISEL', L. O., DAROVSKIKH, G. T., KRASOVSKIY, V. N. and MANAYEVA, G. I., Leningrad Technical Institute imeni Lensovet

[Abstract] Assuming that aegirite concentrate contains as much as 23% iron oxide ($Fe_2O_3 \cdot FeO$), the redoxide equivalent of aegirite concentrate would be 20 parts by mass. Rubbers with this content and with 5 parts by mass of redoxide were studied to determine mass loss at 20° C and during heating at 300° C for 72 hours. With both redoxide and aegirite, no significant changes in structure were observed, but the latter provided a thicker structure and thus there was a lesser accumulation of residual deformation. A stability-in-storage test after holding the samples at 40° C for 2.5 months showed equal durability. Thus, use of aegirite offers considerable savings, since it is a byproduct of rare metal ore enrichment. Figures 3; references 6 (Russian).
[125-12131]

UDC 66.069.84 678.7

BUBBLING POLYMER EXTRACTOR FOR EXTRACTING SYNTHETIC RUBBERS

Moscow KHIMICHESKOYE I NEFTYANOYE MASHINOSTROYENIYE in Russian No 10, Oct 81 pp 10-12

DOMANSKIY, O. V., candidate of technical sciences, GOL'TSOV, I. N., KLOTSUNG, V. A. and MART'YANOV, E. V., engineers, and TUROVSKIY, A. P., candidate of technical sciences

[Abstract] A complex processor was designed, consisting of a steam disperser, a bubbling polymer extractor and a cyclone-type centrifugal extractor. Polymer, solution, circulating hot water and live steam are injected to form pellets, which then are converted into a gaseous liquid mixture before emerging as a synthetic rubber pulp. Current industrial

applications of 4 ton/hour capacity are used in conjunction with other degasification processes. Effectiveness of this process was compared to a volume method involving a mixing device. The bubbling extractor showed 1.6% of mass containing organic compounds, while the volume method showed 2.1% of such impurities. The apparatus has functioned without down time since its industrial application. Mass production will begin at the Penza Chemical Machinery Plant. Figures 2; references 3 (Russian).
[96-12131]

UDC 66.095.2 678.746.222

HIGH TONNAGE POLYMERIZATION EQUIPMENT FOR PRODUCING IMPACT-RESISTANT POLYSTYRENE

Moscow KHIMICHESKOYE I NEFTYANOYE MASHINOSTROYENIYE in Russian No 10, Oct 81 pp 16-18

MEDVEDEV, V. D. and POLYAKOV, V. N., engineers, KONSETOV, V. V., candidate of technical sciences, DRANKOVSKIY, I. K., MEL'NIKOV, V. V., FENIN, Yu. I. and KOBLYANSKIY, V. A., engineers

[Abstract] The system includes a small-capacity rotor-pulsation mixer, into which synthetic rubber, styrene and various additives are injected. The mix then goes to a heated pre-polymerizer and a polymerizer. Finally, it is heated in a vacuum chamber to 220° C, from which it is extracted for later processing. Monomer distillation is used to extract excess heat from polymerization; the monomer is then cooled and re-used. The process increases the mix viscosity to $4 \cdot 10^2$-$6 \cdot 10^2$ Pa-s (expansion unknown). It requires special solutions related to such factors as the thickness of the walls of the vessels used, possible agglomeration of the environment, and the need to dissolve rubber particles in styrene. Comparative analysis prior to design indicated a tube-type heat exchange jacket should be used. Extraction from the vacuum chamber is accomplished by a gear unloading device. The system is now in industrial use. Figures 3; references 7 (Russian).
[96-12131]

UDC 648.4.601.4 : 547.54.39

MODIFYING BUTADIENE-STYRENE RUBBER WITH EPOXY RESINS

Ivanovo IZVESTIYA VYSSHIKH UCHEBNYKH ZAVEDENIY: KHIMIYA I KHIMICHESKAYA TEKHNOLOGIYA in Russian Vol 24, No 12, Dec 81
(manuscript received 26 Feb 80) pp 1558-1562

ZORINA, V. B., ONISHCHENKO, Z. V., KUTYANINA, V. S. and ZAMKOVAYA, V. V., Department of Resin Technology, Dnepropetrosvk Chemical Technological Institute imeni F. Ye. Dzerzhinskiy

[Abstract] Infra-red spectroscopy was used to determine the modification of butadiene-styrene rubber by epoxy resins. Oxygen was a key to the interaction of the compounds, which involved both hydrogen atoms of the rubber methyl group and oxidized groups of the elastomer. Additives such as emulsifiers and stabilizers in the rubber affected changes in the new mixture. Heating of technical rubber containing rosin and neozone D in the presence of epoxy resin was not accompanied by gelatination, indicating the possibility of eliminating rosin and stearic acid from such rubber formulas. Epoxies should be added at the granulation stage or during first mixing, while vulcanization accelerators should be added later to avoid deactivating the epoxy resins. Figures 3; references 5 (Russian).
[122-12131]

WATER TREATMENT

UDC 630*866/.867: 628.356 + 628.356.3

COMPARATIVE ANALYSIS OF PURITY OF WASTE WATERS FROM WOOD PULP PLANTS AFTER PURIFICATION WITH EITHER AERATION OR BIOFILTRATION

Moscow GIDROLIZNAYA I LESOKHIMICHESKAYA PROMYSHLENNOST' in Russian No 1, 1982 (signed to press 18 Jan 82) pp 5-8

KUDRYAVTSEV, G. S., senior scientific associate, ANFIMOV, P. Ye., junior scientific associate, KARELIN, Ya. A., doctor of technical sciences, and ZHUKOV, D. D., candidate of technical sciences

[Abstract] The title study was carried out at four plants (Syava, Asha, Moloma, and Dmitriyevskiy) using aeration and five plants (Zima, Medvezh'yegorsk, Lesosibirsk, Reshotinskiy and Dmitriyevskiy) using both biofilters and aeration. Overall, aeration is more effective than biofiltration. For example, the biochemical oxygen demand of water purified by the former is 6.3 to 30 mg/l, but by the latter, 40 to 220 mg/l; the degree of purification is 95.2 to 99.3% for the former and 40.0 to 87.9% for the latter. A number of other parameters are also listed. Capital expenditures per cubic meter of processed water is 140 to 400 rubles for aeration and 400 to 800 rubles for biofilters. The lower efficiencies of the latter can be explained by the short time that the solution is in contact with the biofilter, the less favorable conditions for microbe growth, and the semi-continuous nature of the process. Figures 4; references 9: 8 Russian, 1 Western.
[130-12027]

CSO: 1841

- END -

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ANALYTICAL CHEMISTRY

UDC 546.185 +549.35 + 66.093 + 631.841

SULFATOPHOSPHATE STUDIES, PART 10: THERMAL CONVERSIONS OF MIXTURES OF HYDROSULFATES AND DIHYDROPHOSPHATES OF POTASSIUM AND AMMONIUM

Alma-Ata IZVESTIYA AKADEMII NAUK KAZAKHSKOY SSR: SERIYA KHIMICHESKAYA in Russian No 1, Jan-Feb 82 (manuscript received 30 Sep 81) pp 7-12

KAIPOVA, Z. K., LITVINENKO, V. I. and BEKTUROV, A. B., Institute of Chemical Sciences, KaSSR Academy of Sciences, Alma-Ata

[Abstract] After obtaining the initial salts by isothermic evaporation and polytherhmic crystallization, various proportions of potassium and ammonium hydrosulfates-dihydrophosphates were studied during thermal conversions in air and ammonia atmospheres. The intensity of thermal effects increased with increased ammonium salts. Chemical analyses of the compounds obtained at 250-750° C showed that the K_2O and P_2O_5 content increased and the SO_3, NH_3 and water content fell with increasing temperature, independent of the initial proportions of reagents in the mixture. In the presence potassium hydrosulfate-dihydrophosphate, ammonium hydrosulfate-dihydrophosphate (and products of its condensation and dehydration) are decomposed at a lower temperature than the pure salt alone. With heating to 250-300° C, dehydration and condensation bring formation of ammonium and potassium pyrosulfates and acid pyrophosphates. Figures 3; references 10 (Russian).
[160-12131]

UDC 546.185 + 661.635 + 66.094.4

CONVERSIONS IN HEATING SULFATE AND MONOALUMINUM ORTHOPHOSPHATE IN MIXTURES WITH PHOSPHORIC ACID AND PHOSPHORIC ANHYDRIDE

Alma-Ata IZVESTIYA AKADEMII NAUK KAZAKHSKOY SSR: SERIYA KHIMICHESKAYA in Russian No 1, Jan-Feb 82 (manuscript received 21 Jun 81) pp 12-17

KALMYKOV, S. I., SHEVCHENKO, N. P. and NIKOLAYEVA, N. M., Institute of Chemical Sciences, KaSSR Academy of Sciences, Alma-Ata

[Abstract] Reactions in a temperature range of 25-800° C were studied of $Al(H_2PO_4)_3$--H_3PO_4--H_2O and $Al_2(So_4)_3$--H_3PO_4--H_2O, and of $Al(H_2PO_4)_3$--P_2O_5

and $Al_2(SO_4)_3$--P_2O_5 at 1200° C, using differential thermal analysis to study the conversions involving phosphoric acid. The liquid and solid phases formed showed no interaction between phosphoric acid and the monophosphate, but aluminum sulfate reacted with the phosphoric acid at 230, 280 and 770°C. Monophosphate dehydration brought condensed phosphates and identical thermoeffects. The sulfate reacted with phosphoric anhydride initially to form a metaphosphate. Figures 3; references 16: 14 Russian, 2 Western.
[160-12131]

UDC 547.993.1.02:595.461

TOXIC COMPONENTS OF VENOM FROM CAUCASUS SUBSPECIES OF SCORPION BUTHUS EUPEUS

Moscow BIOORGANICHESKAYA KHIMIYA in Russian Vol 8, No 2, Feb 82
(manuscript received 18 Sep 81) pp 155-164

GRISHIN, Ye. V., VOLKOVA, T. M. and SOLDATOVA, L. N., Institute of Bioorganic Chemistry imeni M. M. Shemyakin, USSR Academy of Sciences, Moscow

[Abstract] Toxic components of the venom from the scorpion Buthus eupeus (Caucasian subspecies) were isolated and characterized. Amino acid sequence was determined for the insectotoxin I_5 isolated from this venom. The venom was obtained from scorpions living in the wild and in a scorpionarium; the composition of material from both sources was identical. Lyophilized venom could be stored at -10°C for a long time without loss of biological activity. Three neurotoxins towards mammals were isolated from the study material and one insectotoxin. Their homogeneity was shown by means of disc electrophoresis in 15% polyacrylamide gel and by analysis of N-terminal amino acids. All of these toxins were homologous with respective toxic polypeptides isolated from Central Asian subspecies of the scorpion. The insectotoxin I_5 was obtained in highest yield; total amino acid sequence for this toxin was determined. It consisted of 35 amino acids with 4 intramolecular disulfide bonds. Serine, valine, isoleucine, tyrosine, histidine and tryptophan were completely absent in this molecule. I_5 contains and amidated C-terminal arginine radical. Figures 7; references 17: 7 Russian, 10 Western (1 by a Russian author).
[158-7813]

UDC 547.993.02 + 541.63

A PRIORI CALCULATION OF SPATIAL STRUCTURE OF INSECTOTOXIN I_1 OBTAINED FROM VENOM OF SCORPION BUTHUS EUPEUS

Moscow BIOORGANICHESKAYA KHIMIYA in Russian Vol 8, No 1, Jan 82
(manuscript received 29 Jun 81) pp 61-71

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[Abstract] Insectotoxin I_1 represents one component of the scorpion venom and consists of 36 aminoacids (including 8 cysteine radicals). There are no experimental data on the spatial structure of I_1 or its homologues, nor on the location of four disulfide bonds. The attempt to perform the conformational analysis of its structure was performed with incomplete information about the covalent structure of this molecule. In addition, this study was aimed at obtaining confirmation of the physical model and the calculation scheme for an a priori prediction of spatial organization of natural peptides and proteins. The first step in this procedure was to analyze conformational permutations of relatively short fragments containing all eight radicals of cysteine: Met^1-Thr^8, Cys^{16}-Lys^{21} and Cys^{26}-Cys^{33}. From this basis, more complex molecule fragments were analyzed, Met^1-Cys^{20} and Ala^{18}-Cys^{31} and finally the entire sequence. On the basis of this massive evaluation of conformational possibilities, the conformational parameters of the principal and side chains were proposed and the system of four disulfide bonds was identified. Figures 2; references 14: 7 Russian, 7 Western (1 by Russian author).
[152-7813]

UDC 577.153.211.02:547.993;598.126:543.544

MICROCHROMATOGRAPHIC STUDY OF ASSOCIATION OF PHOSPHOLIPASE A_2 FROM VENOM OF CENTRAL ASIAN COBRA NAJA NAJA OXIANA IN PRESENCE OF SUBSTRATES IN MONOMERIC AND MICELLAR FORMS

Moscow BIOORGANICHESKAYA KHIMIYA in Russian Vol 8, No 1, Jan 82
(manuscript received 29 Jun 81) pp 96-101

MAL'TSEV, V. G., ZIMINA, T. M., BELEN'KIY, B. G. and KURENBIN, O. I., Institute of High Molecular Compounds, USSR Academy of Sciences, Leningrad; and PAVLOVA, N. P., D'YAKOV, V. L. and ANTONOV, V. K., Institute of Bioorganic Chemistry imeni M. M. Shemyakin, USSR Academy of Sciences, Moscow

[Abstract] In an earlier study it was shown that phospholipase A_2 from the venom of Central Asian cobra exists in solution in form of an equilibrium of a monomer and dimer mixture. Further, it was shown that Ca^{2+} ions did not affect this equilibrium but lowered the association and dissociation rate. This led to an assumption that the active form of phospholipase A_2

may be a dimer. Based on this assumption, the substrate should have a distinct effect on the association rate and on the monomer-dimer equilibrium. In an attempt to check this hypothesis, a study was carried out of the monomer-dimer equilibrium of E-2 and E-3 isoenzymes of phospholipase A_2 in presence of Ca^{2+} (promotor) and Ba^{2+} (inhibitor) ions and of the effect of micellar and water soluble forms of dihexanoylleucine (the substrate) by the method of frontal gel chromatography and by equilibrium sedimentation. It was shown that the dimerization was retarded somewhat by Ba^{2+} ions but remained unaffected by the water soluble form of the substrate. The micellar substrate led to complete dimerization of E-2 and E-3. The formation of a complex between the enzyme dimer and micellar substrate was promoted by Ca^{2+} ions and retarded by Ba^{2+} ions. It was concluded that the effect of Ca^{2+} and Ba^{2+} ions occurs at the stage of the interaction between the dimer and the micellar substrate and not during the association stage. Figures 3; references 9: 4 Russian, 5 Western.
[152-7813]

UDC: 543.275

ESTIMATE OF POLLUTION OF ATMOSPHERIC AEROSOLS BY TRACE ELEMENTS FROM INDUSTRY

Moscow KHIMIYA V SEL'SKOM KHOZYAYSTVE in Russian No 3, Mar 82 pp 18-23

ZHIGALOVSKAYA, T. N. and KOLOSKOV, I. A., Institute of Applied Geophysics

[Abstract] Attempts were made to produce objective estimates of the pollution of the atmosphere, and of precipitation, by refining the accuracy of determination of "background" concentration and determination of high priority pollution substances. The background concentration of trace elements was considered to be their weight concentration which did not exceed the mean values of concentrations of the same elements in uncontaminated soil in the same region. For snow samples, the background concentrations of trace elements were those related to the mass of dry residue of a filter after filtration of thaw water or evaporation of the filtrate. The background concentration of trace elements in atmospheric aerosols or in precipitation are those concentrations equal to the mean values in uncontaminated soil from the same region. This allows determination of industrial origin pollution above the background concentration resulting from local soil dust. References 8: 5 Russian, 3 Western.
[177-6508]

UDC: 631.416.8:543.052

METHOD OF SAMPLING SOIL TO TEST FOR HEAVY METAL AND PESTICIDE POLLUTION OF THE ENVIRONMENT

Moscow KHIMIYA V SEL'SKOM KHOZYAYSTVE in Russian No 3, Mar 82 pp 36-38

VIRCHENKO, Ye. P., VERTINSKAYA, G. K., candidate of physical and mathematical sciences, and MAKHON'KO, E. P., Institute of Experimental Meteorology

[Abstract] A method is suggested for subdividing test areas according to type of relief and for periodically sampling soils at distances ranging from 0.5 to 30 km from potential pollution sources to assure adequate sampling of the soil. The present frequency and numbers of samples are adequate to assure accuracy equivalent to the potential accuracy of the analysis methods, but terrain relief features must be considered to assure that the potential accuracy is actually achieved. References 2 (Russian). [177-6508]

BIOCHEMISTRY

UDC 547.458.07:576.851.49

SYNTHESIS OF ANALOGUES OF SALMONELLA O-ANTIGENIC POLYSACCHARIDE REPEATING UNIT FRAGMENTS RHAMNOPYRANOSYL-(α 1→3)-GLUCOSE AND MANNOPYRANOSYL-(α 1→4)-RHAMNOPYRANOSYL-(α 1→3)-GLUCOSE

Moscow BIOORGANICHESKAYA KHIMIYA in Russian Vol 8, No 1, Jan 82
(manuscript received 8 Jul 81) pp 114-119

TORGOV, V. I., KUDASHOVA, O. V., SHIBAYEV, V. N. and KOCHETKOV, N. K., Institute of Organic Chemistry imeni N. D. Zelinskiy, USSR Academy of Sciences, Moscow

[Abstract] The goal of the present study was to synthesize analogues of di- and tri-saccharide fragments of the repeating unit of O-specific polysaccharides of Salmonella in which the O-galactose radical was replaced by D-glucose: disaccharide Rhaα1→3Glc and trisaccharide Manα1→4Rhaα1→3Glc. Reaction of 1,2-O-(R and S)-ethyl-idene-α-D-glucopyranose (I) with methylisopropenyl ether in acetone gave 1,2-O-(R and S)-ethylidene-4,6-O-isopropylidene-α-D-glucopyranose (II). When I was reacted with benzaldehyde diacetal in dioxane, the product was 1,2-O-(R and S)-ethylidene-4,6-O-benzylidene-α-D-glucopyranose (III). Reaction of II and III with 2,3,4-tri-O-acetyl-α-L-rhamnopyranosyl bromide gave 1,2-O-(R and S)-ethylidene-4,6-O-[isopropylidene- and benzylidene-]-3-O-(2,3,4-tri-O-acetyl-α-L-rhamnopyranosyl-α-D-glucopyranose, respectively. Finally, in the reaction of 2,3-di-O-acetyl-4-O-(2,3,4,6-tetra-O-acetyl-α-D-mannopyranosyl)-α-L-rhamnopyranosyl bromide with III by the Helferich reaction, the product was a trisaccharide, 1,2-O-(R and S)-ethylidene-4,6-O-benzylidene-3-O-[2,3,di-O-acetyl-4-O-(2,3,4,6-tetra-O-acetyl-α-D-mannopyranosyl)-α-L-rhamnopyranosyl]-α-D-glucopyranose. The structures of individual products were supported by ^{13}C NMR spectroscopy. References 12: 5 Russian, 7 Western (2 by Russian authors).
[152-7813]

UDC 547.315.2:547.518

PROPYLENE DIMERIZATION IN PRESENCE OF NICKEL-CONTAINING COMPLEX CATALYSTS FIXED ON PHOSPHORYLATED POLYSTYRENE

Leningrad ZHURNAL ORGANICHESKOY KHIMII in Russian Vol 18, No 2, Feb 82 (manuscript received 2 Mar 81) pp 265-269

ALIYEV, V. S., KHANMETOV, A. A., MAMEDOV, R. Kh., KERIMOV, R. K. and AKHMEDOV, V. M., Institute of Petrochemical Processes, AzSSR Academy of Sciences

[Abstract] The complex catalysts fixed on polystyrene were obtained by mixing benzene solutions or suspensions of nickel compounds with polystyrene containing phosphine groups. Without an activator these complexes exhibited no catalytic activity. They are activated by $(C_2H_5)_2AlCl$ or $(iso\text{-}C_4H_9)_2AlCl$ and retain their activity for a long time. The spent catalyst can be reactivated by addition of a fresh portion of aluminumorganic compound. The most effective catalyst is obtained from organic salts and π-complexes of nickel on phosphorylated polystyrene, reaching an activity of 1300-1700 g of the dimer per g of nickel per hour. Aluminum trialkyls are inactive as cocatalysts and in presence of $EtAlCl_2$ or $iso\text{-}BuAlCl_2$ higher oligomers of propylene are formed. The optimal reaction temperature is in the range of 20-60°C. In aromatic hydrocarbons the reaction is very fast. In alkanes it is much slower, but the catalyst retains its activity for up to 1000 hrs. In the pressure range of 1-10 atm, the dimerization rate is directly proportional to the pressure. Figure 1; references 10: 8 Russian (2 by Western authors), 2 Western.
[161-7813]

DEVELOPMENT OF PLASTIC PRODUCTION REVIEWED

Moscow EKONOMICHESKAYA GAZETA in Russian No 51, Dec 81 p 15

[Text] "Solution of the complex problems associated with creating highly productive production processes, making sensible use of minerals, protecting the environment and satisfying the individual's needs more fully are directly associated with further development of polymer chemistry," noted Leonid Il'ich Brezhnev in the seventh volume of his works, "Leninskim kursom" [Following Lenin's Course].

Production of high quality polymers with prescribed technical characteristics, to include reinforced and filled plastics as well as tubing made from plastic, is being expanded in the 11th Five-Year Plan in compliance with decisions of the 26th CPSU Congress. A complex of measures is being implemented to achieve fuller satisfaction of the national economy's demand for chemical additives to be used in polymers, synthetic fibers, filaments and dyes, packaging materials and special ultrathin polymer films.

Beginning in 1965 the country's production of plastics and synthetic resins increased by an average of 1.5 times every 5 years. In 15 years it increased from 800,000 tons to 3.6 million tons. Application of these progressive materials in the Ninth and 10th Five-Year plans made it possible to free more than 9 million tons of ferrous and nonferrous metals and about 900,000 tons of natural fibers for other purposes. Production of plastics and synthetic resins will increase by about 1.7 times in the 11th Five-Year Plan.

On the Forward Edge of Technical Progress

More than half of the country's plastics and synthetic resins are produced by enterprises of the Ministry of Chemical Industry. These products are also produced by the USSR Ministry of Petroleum Refining and Petrochemical Industry, the Ministry of Mineral Fertilizer Production and a number of other ministries.

The procedures for producing the entire contemporary assortment of plastics and synthetic resins have now been developed by the sector's scientific research organizations in collaboration with academy and educational institutes. Polycarbonate, polyacetals, polybutylene terephthalate, polyphenylene oxide, new brands of polyamides and composites based on various forms of polymers are intended for construction purposes. The range of heat resistant and lightened plastics has broadened.

One ton of these materials replaces 6-12 tons of lightened steel, 6-10 tons of nonferrous metals and a ton and a half or two of aluminum. Moreover two to three times less power is required to produce and process plastic than an equivalent quantity of metals. The use of 2 tons of thermoplasts is equivalent in the national economy to saving the labor of one worker (due to the minimal amount of labor required to process them into articles).

Substitution of glass by polyethylene film in hothouse construction produces a savings of 162,000 rubles of capital investments per hectare. When we use this film to cover silage, even the surface layers keep, and the yield of ready-to-eat feed increases by 3-4 percent while nutrient losses decrease from 20-50 to 2-6 percent, depending on the storage method.

New brands of effective ion-exchange materials, polyelectrolytes, binders, adhesives and embedding composites exhibiting remarkable properties are also being introduced today into the national economy. All of these materials are finding broad use, and they are imparting new qualities primarily to consumer goods as well as the products of aviation, motor vehicle, ship building, electronics and electrical engineering industry.

The production of many new types of plastics is being organized in the 11th Five-Year Plan. Moreover the time it takes for these products to reach consumers will be reduced owing to active reconstruction and reequipment of chemical enterprises. Facilities to produce new materials, installed in place of obsolete production operations, are to be erected and put into operation on an accelerated schedule. The existing reserves for intensifying production processes and utilizing more effective catalytic systems, reagents and additives must be placed into action.

In this case the polycarbonate output capacities will be increased by 1.7 times, polyamide capacities will triple, and production of unsaturated polyesters will increase by 1.5 times. In comparison with 1980, by the end of the five-year plan production will increase by 2.2 times for polyolefins, 2.3 times for polystyrene and 1.6 times for polyvinyl chloride.

Extensive research was started in the present five-year plan to create highly heat resistant and low-combustibility composites, highly selective microfilters and semipermeable membranes, wear resistant polymers based on a metal-polymer matrix, light-sensitive and cross-linking composites exhibiting heightened adhesion, and polymer-polymer composites exhibiting a complex of unique properties. Completion of these projects will significantly raise the technical level of plastics industry.

It should be noted that until recently, not enough attention was being devoted in the sector to development of so-called low-tonnage chemistry, which produces various catalysts, plasticizers, static control agents and other additives which improve article quality and which are irreplaceable in a number of cases in terms of production of new polymers. The need for raising the production volume of low-tonnage chemistry was noted in decisions of the 26th CPSU Congress. Modern facilities producing several forms of highly effective catalysts have now been created at all new large polyethylene and polypropylene production operations. There are plans for organizing production of the necessary forms of additives at enterprises belonging to various ministries, with the intention of subsequently halting importation of these products.

Resource Economization

Plastics industry is a major consumer of crude hydrocarbons and of electric and thermal energy. The reserves for economizing on these resources in the sector are sizeable. But the great potentials for creating, for example, energy recycling production processes are not being utilized adequately yet. Large amounts of heat produced by chemical reactions are not being utilized: Instead, this heat is being dissipated in the atmosphere or lost together with liquid wastes.

Assimilating production of new polymers in the 11th Five-Year Plan, the sector's enterprises must turn special attention to introducing highly effective wasteless production processes ensuring integrated and economical use of raw materials, fuel and power. The example of the best labor collectives persuasively shows that initiative and a creative approach to organizing the economization campaign can produce substantial results.

The "Polimir" Production Association in Novopolotsk has accumulated good experience in using secondary power resources in production. This association is successively implementing an entire complex of organizational and technical measures. As a result practically full utilization of mobile secondary fuel resources and a significant proportion of the heat of chemical reactions and high-temperature smoke gases has been achieved. In the 10th Five-Year Plan the collective of "Polimir" saved 25 million kilowatt hours of electric power, 160,000 gigacalories of heat and 5,000 tons of standard fuel. Today, more than 40 percent of the association's total production is based on the use of secondary power resources and heat from chemical reactions. The experience of the "Polimir" Association was approved by the CPSU Central Committee.

The problem of utilizing the plastic itself is also becoming more important. The USSR Gossnab has been given the job of organizing a system for collecting, preparing and processing polymer articles. It was with this purpose that it created the main scientific research organization to deal with the entire range of problems associated with utilization of plastics--"Mashpriborplastik" (Khar'kov). This secondary raw material represents a major reserve for increasing plastic production and economizing on the petroleum products that serve as the raw material from which the plastic is acquired.

Today 52 percent of the norms followed in plastics industry are scientifically grounded. Their proportion will constantly grow. Their improvement represents a dependable source of economizing on material resources. By capitalizing on this factor, plastic enterprises of just the Ministry of Chemical Industry are to save raw materials, heat and electric power worth 1.6 million rubles in 1982.

Calculations show that were the newly constructed enterprises in Tomsk, Omsk, Shevchenko, Budennovsk and a number of other cities to reach their planned output capacities ahead of schedule, the total savings could be increased to 6.5 million rubles. As we know, the norms for consumption of material resources are set more leniently in the period when new output capacities are being assimilated. Reducing the time to raise their production to normal promises a significant impact.

However, the Ministry of Chemical Industry created many disproportions between enterprises producing the raw materials and the processing enterprises when it brought new plastics enterprises into being. It is for this reason that the capacities of the Shevchenko, Prikumsk and Omsk plants are not being fully utilized. There is a serious lesson to be learned from this by the administration of the Ministry of Chemical Industry. What it must do first of all is increase its attention to expert analysis of the plans, and verify their technical and economic grounds more carefully.

Following the Example of the Best

Next year, just enterprises of the Ministry of Chemical Industry--the main supplier of polymers--must increase production of plastics and synthetic resins by about 200,000 tons. Plans have been made to start up and assimilate new output capacities in the Mogilev "Khimvolokno" Association, the Moscow "Plastik" Scientific-Production Association, the Kazan' "Orgsintez" Association and the Tomsk and Zima chemical plants.

It will be important for enterprises producing plastics and synthetic resins not to simply reach their planned targets but also make up the amount they fell behind in 1981. The results of the last 11 months indicate that the production of some forms of polymers has fallen behind, to include important ones such as polyethylene, polypropylene, polystyrene and polychlorovinyl resin. Business managers often seek excuses in "objective causes," particularly a shortage of raw materials. But an analysis would show that in January-November, consumption of raw materials exceeded the norms by almost 2 million rubles at the Omsk Plastics Plant, by over 900,000 rubles at the Prikumsk Chemical Plant and by 445,000 rubles at the Vladimir Chemical Plant.

Concurrently the production targets for January-November were significantly exceeded in relation to caprolactam, cellulose acetate, and phenolformaldehyde, carbamide and alkyd resins.

The "Polimir" Association in Novopolotsk and the Gur'yev Chemical Plant are working rhythmically, and with high effectiveness. As an example at the beginning of the 11th Five-Year Plan the Gur'yev plant consumed less raw materials per ton of product than specified by the approved norms--23 kilograms of ethylene and 40 kilograms of propylene. To obtain a ton of ethylene, this plant uses 3.3 rather than 3.6 tons of crude hydrocarbons in its pyrolysis operation. In January-November the enterprise saved material resources worth 150,000 rubles.

Polotsk chemists are consistently reducing relative consumption of crude hydrocarbons and other materials. The "Polimir" Association saves 10 kilograms of ethylene, 22 kilograms of propylene and 7 kilograms of nitrilacrylic acid for every ton of products it manufactures. In 11 months it has managed to save 11 million kilwatt-hours of electric power, 42,000 gigacalories of thermal energy and about a thousand tons of comparison fuel.

The chemists of Polotsk and Gur'yev have adopted sizeable pledges to save on resources in 1982. Dissemination of the experience of these collectives may serve as a reliable means of raising the lagging enterprises to the level of the best.

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CSO: 1841/166

LITHUANIAN CHEMICAL INDUSTRY DEVELOPS

Vilnius SOVETSKAYA LITVA in Russian 3 Mar 82 p 2

[Interview with Lithuanian SSR Gosplan Deputy Chairman A. Iovarauskas: "Lithuania's Big Chemistry"]

> [Text] Owing to the untiring concern of the party and government for developing productive capacities in Soviet Lithuania, new industrial sectors have been created and are now undergoing development. One of them is the chemical sector. Today the republic possesses major centers of chemical industry--Ionava and Kedaynyay, and modern enterprises are now operating in Vilnius and Kaunas. Founded in the republic's capital, the All-Union Scientific Research Institute of Applied Enzymology is now working on the problem of creating new enzyme preparations and introducing them into different sectors of the national economy. A correspondent of SOVETSKAYA LITVA met with Lithuanian SSR Gosplan Deputy Chairman A. Iovarauskas and asked him to reply to a number of questions pertaining to development of chemical industry in Soviet Lithuania.

[Question] The readers would like to know what the chemical sector of Lithuanian industry was like at the time Soviet rule was established.

[Answer] The answer to that is short: It was simply nonexistent. After all, two little paint and varnish plants, the "Inkaras" Shareholders' Society producing rubber footwear and primitive workshops producing domestic chemical articles and cosmetics do not make up a sector.

[Question] When did creation of big chemistry in the republic begin, and what made it necessary?

[Answer] Chemical industry was born and began to develop in Soviet Lithuania following the May (1958) Plenum of the CPSU Central Committee, which called for sizeable measures to develop this industrial sector in the country as a whole. At that time, specialists of the scientific research and planning organizations developed a program for construction of a number of large enterprises. It was in this period (1959-1960) that erection of the first representatives of big chemistry began--the Kedaynyay Chemical Plant, the Vilnius Plastic Articles Plant, the Kaunas Artificial Fiber Plant and the Ionava Nitrogen Fertilizer Plant (today the "Azot" Association). Facilities producing household chemicals were also built and rebuilt.

[Question] Please tell us why chemistry is significant to the republic's national economy and how effective the use of chemical products is.

[Answer] These products play an important role in satisfying the needs of all sectors of the national economy and in raising management effectiveness. I should first of all point out the significance of increasing consumption of mineral fertilizers in agriculture. One centner of such fertilizer increases the yield of cereal crops by about 1.3 centners. The republic's farmers are now using about 2.2 million tons of relative units of mineral fertilizers. Moreover not only are our enterprises supplying nitrogen and phosphorus fertilizers to the republic; they are also exporting some of their products.

Or look at plastics. Their use in machine building and instrument making reduces labor requirements, improves article construction and decreases consumption of ferrous and nonferrous metals. The estimated savings from using 1 ton of plastics in instrument making is over 1,200 rubles. And each year the Vilnius Plastic Articles Plant, a specialized producer and supplier of plastic articles in the republic, produces about 6,500 tons of such articles. You can imagine the economic impact. Moreover the plant produces large quantities of polyethylene film and tubing for agriculture and construction. Use of polymer tubing and molded parts reduces the labor of installing pipelines by 3-3.5 times.

Our traditional sectors--textile, knitted fabric and furniture--have become major consumers of acetate and triacetate filaments and carbamide resins produced in the republic.

It is also difficult to overstate the significance of microbiological products--nutrient yeast, additives and enzymes produced by the Kedaynyay Biological Plant and the Vilnius Enzyme Preparation Plant. We know for example that 1 ton of nutrient yeast helps to produce an additional 800 kg of pork or 1.5 tons of poultry or 15,000-20,000 eggs.

[Question] Let me ask you to describe the results of the sector's development in the 10th Five-Year Plan.

[Answer] In the last five-year plan chemical industry's commercial production volume increased by 32 percent, which was somewhat greater than the rate of growth of industrial production in general. Production of mineral fertilizers increased by a time and a half, while production of household chemicals increased by 30 percent. The sector's productive potential enjoyed further development. Large capacities producing mineral fertilizers (nitrophos and ammophos) have been placed into operation in the Ionava "Azot" Association and the Kedaynyay Chemical Plant, and the capacities for producing synthetic resins and artificial fibers have been enlarged. The cost of new fixed capital placed into operation is an impressive sum--152 million rubles.

The year 1980 was marked by a noteworthy event--the commissioning of the first generation of the Mazheykyay Petroleum Refinery. Its erection required major efforts from builders, installers and operators. CPSU Central Committee General Secretary, Chairman of the Presidium of the USSR Supreme Soviet Comrade L. I. Brezhnev congratulated them on their glorious labor victory.

[Question] And now to conclude, tell us about the prospects for the sector's development in the 11th Five-Year Plan.

[Answer] Attention is focused today mainly on reconstruction and reequipment of existing enterprises, and on further intensification of chemical production operations. We have plans for rebuilding the Kedaynyay Chemical Plant, increasing the existing ammonium and carbamide production capacities in the Ionava "Azot" Production Association and finishing reconstruction of the Kaunas Artificial Fiber Plant imeni 50-Letiye Oktyabrya. Builders of the Mazheykyay Petroleum Refinery face complex and important tasks. This year a bitumen facility must be placed in operation, and in 1983 the second petroleum refining complex is to become operable.

By completing the program spelled out by the five-year plan, we will be able to increase the republic's petroleum refining volume by six times in the five-year plan. By 1985, production of mineral fertilizers will rise significantly, and the volume of chemical consumer goods produced will reach almost 100 million rubles.

Almost the entire increment in production at chemical enterprises is to be reached through growth in labor productivity. The five-year plan foresees measures, already being implemented, to reduce harmful discharges into the atmosphere and into water basins. The Lithuanian SSR Scientific Research Institute of Construction and Architecture has created an original procedure for processing one of the wastes of mineral fertilizer production--phosphorogypsum--into building plaster. It looks like this procedure will be the basis for planning a large experimental shop at the Kedaynyay Chemical Plant.

11004
CSO: 1841/166

PROBLEMS BOG DOWN PORT CONSTRUCTION

Kiev RABOCHAYA GAZETA in Russian 24 Feb 82 p 1

[Article by RABOCHAYA GAZETA correspondent P. Shevtsov: "The Port's New Concerns"]

[Text] The administration building of the former "Odesskhimstroy" Trust is now the site for a meeting of the party staff of one of the republic's largest construction projects now underway on the shores of the Adzhalyk drowned river valley. This year erection of the "Karbamid" chemical complex of shops producing carbon dioxide and dry ice and of a methanol transloading line was started on the territory of the Odessa Portside Plant imeni Komsomol Ukrainy.

Construction did not even cease on these shores after the second ammonia production unit released its first products on 15 September 1979, three and a half months ahead of schedule, or after the Gorlovka-Odessa ammonia pipeline--the first in our country and the largest in Europe--went into operation on 11 October of the same year, or after builders and installers completely vacated the operating facilities to make way for the operators.

On one hand the plant increased its own output capacities: It produced and transloaded liquid ammonia, carbamide and superphosphate acid. On the other hand the residential settlement of Yuzhnyy--the future city of the chemists and port workers--grew a few kilometers from it. Also at that time, preparations were started on the east shore of the drowned river valley to erect deepwater moorings for a coal handling complex and a container terminal which, with time, will assume the burden of processing 25 million tons of cargo each year and which will transform the young port of Yuzhnyy into our country's largest harbor.

And now a new and very important stage in the biography of both the portside plant and port has begun. Construction of two carbamide production units with an output capacity of 330,000 tons each, and of a methanol transloading complex capable of moving up to a million tons of chemical cargo in a year will be completed by the end of the 11th Five-Year Plan. And this year the collectives of the "Odesspromstroy," "Chernomorgidrostroy," "Odesstransstroy," "Odesszhilstroy" and other trusts must assimilate about 30 million rubles and make dozens of facilities operational.

Unfortunately the "Odesskhimstroy" Trust, the collective of which participated successfully in the portside plant's construction for many years and which emerged the winner in socialist competitions among the republic's builders many times, was simply disbanded. Obviously the blame for this lies in the shortsightedness of the executives of the "Odesspromstroy" Combine, of which the trust was a part.

And so, what is on today's agenda for the meeting of the construction project's party staff?

Looking at the strategic concerns, we find that they are simple and understandable: Everything possible must be done to keep from stumbling at the starting gun, to keep from falling behind in the initial stage of construction. But the concrete tasks facing the client and the contractors are more diverse: Concern must be shown for the personal conveniences of the workers, public dining halls, stores, cafeterias and service booths must be created, housing construction must be accelerated, suitable buildings must be converted into residence halls, and simultaneously a more active effort must be made at the facilities themselves.

Unfortunately we have already "sprung some leaks." Take as an example construction of housing by the Construction and Installation Administration No 5 of "Odesszhilstroy" Trust: The required sense of urgency cannot yet be sensed, and important problems associated with providing bricks to the construction sites are being solved all too slowly. Incidentally the building plans called for panels but the contractor demanded something different. It was just not to his liking. And so the plan had to be redrawn, as a result of which the deadline for placing the housing into operation may have to be postponed.

Transport workers did not do their best in the first stage of construction either. This is even true of the "Odesstransstroy" Trust, which totally refuses to begin working on the new project.

Many complaints have accumulated against the "Odesszhelezobeton" Production Association. This is only the second month of the year, and it already owes the builders hundreds of tons of reinforced concrete articles.

The collective of the Order of Lenin "Chernomorgidrostroy" Trust landed a labor force on the east shore of the drowned river valley two and a half years ago. It was here that the Floating Facility Construction Detachment No 6 (PSO-6) settled itself, and it is here that the vast quayside of the future giant port is coming into being. It will still take much more time to complete the enormous volume of work before ocean-going bulk carriers and ore carriers will begin mooring to the new deepwater docks. Specialists of this famous trust have considerable experience and an enviable reputation--they are not troubled by the unusual nature of the coal complex and methanol transloading line they are to build. But we are forced to assert that the level of labor organization today in subdivisions of the PSO-6 is low, and to speak frankly, the quality of production is poor.

Electricians of Special Construction Administration No 404 are already holding back their associates: Specialists of the "Yuzhgidrospetsstroy" Trust have still not familiarized themselves adequately with what they have to do at facilities of the complexes under construction.

All of these problems might seem to be minor, and typical of most new construction projects. But it is no secret to anyone that these minor problems threaten failure of network schedules in the future. This is why the party staff of the construction project, which is headed by Ye. G. Borsh, secretary of the Odesskaya Oblast Committee of the Ukrainian SSR Communist Party, assumed, right from the start, a course of fighting for efficient labor organization, for high labor quality, a course toward creating an atmosphere of exactingness and a creative attitude toward assigned work at the construction project.

11004
CSO: 1041/166

ORGANIC SYNTHESIS INSTITUTE LISTS ITS SUCCESSES

Riga SOVETSKAYA LATVIYA in Russian 14 Mar 82 p 2

[Article by Doctor of Chemical Sciences E. Lukevits, deputy director, Order of the Red Labor Banner Institute of Organic Synthesis, Latvian SSR Academy of Sciences: "For Effective Research"]

[Text] Just in the 10th Five-Year Plan our institute created 19 new medicinal preparations with which to treat oncological, cardiovascular and psychoneural diseases and viral and bacterial infections. Medical practice uses a total of 32 of our preparations, and about 20 compounds are used in agriculture.

Such effective introduction of scientific developments is ensured in many ways by the structure itself of the institute, which embodies the principal links of a continuous chain: theoretical research--applied developments--experimental production--industrial production. The last two links are represented by two plants. One of them is experimental, and it runs all processes associated with the chemical transformations of many synthetic methods, and the other is the Riga Medical Preparations Plant, which assimilates and produces ready-to-use biochemical preparations. All of this has a significant influence on the countenance of the republic's chemical and chemical-pharmaceutical industry. Preparations created by the institute are also synthesized by the "Olaynfarm" Production Association, which produced 25 preparations in 1981, and the "Biokhimreaktiv" Scientific-Production Association, which produced 19 preparations. Outside the republic, synthesis of bioorganic compounds by the Riga methods has been assimilated at the Vurnary Chemical Combine, the Kursk, Moscow and Leningrad chemical-pharmaceutical plants and several other enterprises.

Each year our institute devotes increasingly greater attention to scientific research aimed at creating new, effective ways to chemicalize agriculture. About 20 compounds intended for such use are already being industrially produced and broadly applied. They include, for example, diludin, used to preserve the qualities of carotene in grass meal. It is also used as a feed additive to stimulate the growth of farm animals.

Antihelminthic drugs--tsiazon and tsiazid, and a new compound--divezid, active against intestinal parasites of ruminant animals, have also proven themselves well. The antibacterial drugs--furatsilin, furagin and furazolidon--and their diverse forms have gained a firm foothold in veterinary and medical practice.

It was emphasized at the 26th CPSU Congress that close integration of science with production is an urgent requirement of the modern era. The institute's scientific research is proceeding within the framework of 22 research topics contained within the all-union specific-purpose integrated programs, in the program for solving scientific-technical problems and in the coordination plans of the USSR Academy of Sciences in the field of natural sciences. The institute is the principal executor of two integrated programs. In one of them, "Peptide-Protein Bioregulators," we are creating a production sector new to our republic and the country, production of drugs based on natural raw materials--peptides and proteins.

Oxytosin, one of the preparations of this class, deserves special attention. The results obtained in the laboratory and at scientific research farms such as the "Siguida," "Krimulda," "Liyelplatone" and others are demonstrating the high effectiveness of oxytosin in stimulating labor and lactation in sows and cows. The plant is now using a new procedure for synthesizing this compound. This has significantly reduced its cost in comparison with that of the same products of foreign companies. This major effort by the institute's scientists earned the USSR State Prize in 1981. New methods of synthesizing prostaglandins--compounds stimulating growth in farm animals--have also been developed in conjunction with research on peptide-protein hormones.

One of the most pressing problems in animal husbandry is the heightened sensitivity of young animals to disease, especially of animals shipped to large industrial complexes for fattening. As a rule young piglets and calves are reluctant eaters: They become listless, and they gain weight slowly. This problem can be surmounted by a new stimulator of growth in animals as well as birds--kvaterin. Animals fed this drug exhibit a dramatic improvement in appetite and food assimilation, and their resistance to disease rises. Piglets 2 months old gain 9-12 percent more weight than animals not receiving kvaterin.

Extensive introduction of original medicinal preparations and agricultural chemicals is being promoted in many ways by a socialist competition that has taken shape at the institute. In 1981 our collective adopted higher socialist pledges, which were completely satisfied. The procedures for making several new forms of medicinal preparations and three veterinary drugs were created. The institute's colleagues published one monograph, two collections of articles and several dozen articles in all-union journals and in the international press.

In 1981 the Institute of Organic Synthesis collaborated on the basis of 203 agreements of scientific-technical cooperation in chemistry, medicine and agriculture with 60 institutes of the USSR Academy of Sciences and the academies of the union republics, with 88 sector institutes, with 20 institutions of higher education and with 35 republic institutions. It also cooperated in international scientific projects. Many of our projects have been exhibited at several international fairs and exhibitions, and the institute is a permanent participant of the Exhibition of the Achievements of the National Economy of the USSR and the Latvian SSR.

This is far from a complete list of the projects our scientists are working on. The collective of the Order of the Red Labor Banner Institute of Organic Synthesis, Latvian SSR Academy of Sciences won the all-union socialist competition for successful fulfillment of the state plan for the USSR's economic and social development in 1981, and it was awarded the perpetual Red Banner of the CPSU Central Committee, the USSR Council of Ministers, the AUCCTU and the Komsomol Central Committee. This great honor is inspiring the institute collective to new achievements.

11004
CSO: 1841/166

CAUSTIC SODA RAISES AGRICULTURAL PRODUCTIVITY

Moscow SOTSIALISTICHESKAYA INDUSTRIYA in Russian 20 Mar 82 p 2

[Article by special correspondent I. Mordvintsev: "Fertility Vitamins"]

[Text] Neat rows of cellophane bags containing milky-white crystals stand beside the wall. These are the first products of a granulated caustic soda shop that has just begun production. What are the crystals for?

"For agriculture," explains Ye. Sviridenko, chief of this production operation, which belongs to the Volgograd "Kaustik" Association. "There is a great demand for them in feed preparation."

How can this be, since it is not even safe to touch this product with bare hands (there is good reason for its name)? Is this a mistake, that it is to be used as cattle feed? No, we find, no mistake has been made.

Research conducted in recent years showed that by processing a relatively low grade feed such as straw with 2 percent caustic soda solution we can raise its nutrient content by a time and a half. When this "dish" was fed to an experimental herd of cows, their milk yields grew noticeably. The effect is even more significant than that produced by steaming straw; moreover it is achieved with significantly lower material and labor outlays.

In former times this product was sent to users in liquid form or as monocrystals in barrels. This was highly inconvenient. Therefore Volgograd workers began creating a new production operation from the "tail end": They built a granulation shop, and only after that did they begin working on the shops producing the "raw" semifinished product. Meanwhile they got the semifinished products they needed from the association's other operations that were already producing. This made it possible to start delivering granulated caustic soda to agriculture a whole 2 years sooner.

The raw material from which caustic soda is produced is ordinary table salt. Let me test your knowledge of geography: From where can this salt be obtained? How about from the Baskunchak salt works in Astrakhanskaya Oblast?

"Wrong," smiled V. Sitanov, the association's general director. "True, we did get salt from Baskunchak at first. But our new way is much easier."

Millions of years ago waves of an ancient sea splashed over our part of the country. On drying out, this sea left a salt "lens" many kilometers wide. It was just such a "lens," discovered almost right next door to "Kaustik," that the Volgograd chemists decided to utilize. They drilled a deep well and began pumping river water into it to obtain a saturated salt solution. And now they pump hundreds of thousands of tons of this solution into the electrolysis shop. They supply both themselves and neighboring chemical enterprises.

But as we know, table salt contains not only sodium--the principal element from which caustic soda is produced, but also chlorine. This element was put to work here as well. Volgograd chemists use it to make a large complex of toxic chemicals for agriculture. First among them is chlorofos, of which "Kaustik" is the country's main producer.

And not that long ago production of an effective plant protection resource, fenazon, was started here. By applying a 2 percent solution of this drug in the space between sugar beet rows, weeding would not be required all summer. Because they are not inhibited by weeds, the beets accumulate a larger quantity of sugar, and the yield grows noticeably. It does not take any special wisdom to see why delegations from rural regions often come to Volgograd for this miracle powder. Last year the fenazon production plan was exceeded by 15 percent, and production is ahead this year as well.

Workers and specialists of "Kaustik" are increasing production of goods for the countryside from one day to the next. The association collective is in the first ranks of Volgograd laborers competing for an honorable welcome for the USSR's 60th anniversary.

11004
CSO: 1841/166

BRIEFS

FIBER PRODUCTION COMPARED--In 1913, Russia manufactured just 25 tons of artificial fiber out of imported cellulose. Last year the USSR produced 1.2 million tons of chemical fibers and filaments. [Text] [Vilnius SOVETSKAYA LITVA in Russian 3 Mar 82 p 2] 11004

CHEMICAL PRODUCTION AHEAD--Laborers in chemical industry surpassed their planned total production volume in the first year of the 11th Five-Year Plan. The country received 2.8 million tons of caustic soda, more than 4 million tons of synthetic resins and plastics and more than 1 million tons of synthetic detergents. [Text] [Vilnius SOVETSKAYA LITVA in Russian 3 Mar 82 p 2] 11004

SAVINGS FROM SYNTHETICS--The USSR national economy saves almost 1,900 rubles per ton of products by using polyethylene and 5,000 rubles by using propylene. [Text] [Vilnius SOVETSKAYA LITVA in Russian 3 Mar 82 p 2] 11004

KINGISEPP FERTILIZER PRODUCTION--Leningrad Oblast. The Kingisepp "Fosforit" Association has exceeded its production plan by tens of hundreds of rubles since the beginning of the year. Huge new fertilizer production capacities have reached their planned output ahead of schedule here. Komsomol members and young people are making a great contribution to the overall success. They have initiated an extensive socialist competition to complete the annual production program ahead of schedule, to achieve high product quality, to raise labor productivity and to economize on materials. [Text] [Moscow SOTSIALISTICHESKAYA INDUSTRIYA in Russian 16 Mar 82 p 3] 11004

FERGANA 'AZOT' PRODUCTION ASSOCIATION--"The product sales plan was completed by 80 percent, and the labor productivity plan was completed by 78 percent." So reads a line from a report on the work of "Azot" (director, R. Akramov) for the last 2 months. Nor were things any better at the enterprise in March: There were interruptions in production, the work was nonrhythmical, and the quality of the products was below standard. This is already the second year that such a situation has persisted, and it came into being mainly due to the failure to reach the planned output capacity of the acetate cellulose production operation. Construction took a long time, and the time of its start-up and assimilation dragged on unjustifiably. And this was mainly at the fault of the chemists themselves: Unable to get production running smoothly, they overconsumed scarce raw materials, exceeded the norms for consumption of fuel and electric power and caused equipment to break down. The repair base of "Azot" is weak. Thus the Ministry for Mineral Fertilizer

Production has been forced to perpetually send troubleshooting teams of instrument control specialists, repairmen, fitters, welders and mechanics from kindred enterprises to Fergana. The low qualifications of the personnel and the turnover resulting from the shortage of living space are also making it difficult. The personnel situation is now being rectified, and management of the shops and sections has improved. But as we can see, there is still much more to be done. [Text] [Moscow SOTSIALISTICHESKAYA INDUSTRIYA in Russian 16 Mar 82 p 3] 11004

CSO: 1841/166

UDC 620.97

DIRECTION OF GROWTH OF UKRAINIAN FUEL-ENERGY COMPLEX

Kiev VISNYK AKADEMIYI NAUK UKRAYINS'SKOYI RSR in Ukrainian No 2, Feb 82 pp 50-53

KAL'CHENKO, V. N., doctor of economic sciences, KUBRUSHKO, A. M., candidate of economic sciences, and PIRIASHVILI, B. Z., candidate of economic sciences

[Abstract] Further growth of the fuel-energy complex is a major goal of the 11th Five-Year Plan. The present energy situation in the Ukrainian SSR is a decreasing supply of energy resources in face of greater fuel and energy demands. Some ways of increasing the supplies of energy resources are the development of a gas pipeline network, installation of oil pipelines to petroleum refineries, economic use of fuel and energy resources, and a program for the development of the nuclear energy industry. Goals in the area of coal, a major resource of the Ukrainian SSR, include the development and introduction of technology and methods for mechanizing and automating cleaning operations on sloping and steeply inclined coal seams and increasing the efficiency of utilizing low-quality solid fuels. Goals for the oil and gas industry are increasing the supply of raw materials and improving the means and methods for finding and working oil and gas deposits. Because of the difficult geological conditions for working oil deposits in the Ukrainian SSR, the oil recovery factor is lower here than for other parts of the country, and new methods for working under these specific conditions are needed. Increased use of gas condensate and development of a technology for working gas condensate deposits should increase gas supplies. The efficiency of fuel and energy sectors would also be increased by combining all sectors into a single complex under a single administrative agency. Coordination of research carried out by various organizations and institutions by a regional centralized agency is also recommended. References: 2 (Ukrainian).
[139-9307]

UDC 66.023 : 669.295

EXPERIENCE AND PROSPECTS FOR USING TITANIUM EQUIPMENT AND UTENSILS IN CHEMICAL PRODUCTION

Moscow KHIMICHESKAYA PROMYSHLENNOST' in Russian No 2, Feb 82 pp 100-102

FOKIN, M. N., RUSKOL, Yu. S. and KORNEYEVA, G. B.

[Abstract] The implementation of titanium in chemical production processes is reviewed from initially isolated applications in the 1960s, to intensive consumption in the mid-1970s, to a more rational utilization presently, particularly in the production of chlorine compounds and caustic soda. Production of many toxic chemicals would be impossible without titanium containers to combat corrosion. Waste waters, including sewage and industrial waste containing mercury, processes requiring great purity, and production of aniline dyes and nitrogen compounds, are other important activities where titanium vessels are indispensable. Since titanium is not abundant, an important area for research is in determining suitable but not excessive thicknessss of the metal in heat-exchange and chemical applications, and in improving the production processes. Figures 2; references 10: 8 Russian, 2 Western.
[168-12131]

UDC 662.749.33

ABSORBING OIL QUALITY

Moscow KOKS I KHIMIYA in Russian No 3, Mar 82 pp 34-36

KOGAN, B. Ye. and KUZ'MINA, Ye. Ya., Eastern Scientific Research Institute of Coal Chemistry

[Abstract] Several methods for reducing naphthalene content in the absorbing oil fraction, including applying additional heat to rectifying columns, redistilling, and live steam additions, have shortcomings. In the USSR, best results in producing absorbing oil to meet the standards for 2nd quality oil are achieved at the Nyzhniy Tagil Metallurgical Plant; none of the methods produce 1st quality oil. That plant uses the system of reducing the high-boiling fraction by cutting the absorbing fraction, thus increasing reflux at lower levels. However, this process leaves more than 13% naphthalene. The authors suggest distilling fresh oils that will boil off at below 300° C with 90-92% yield, and also revising the standards for absorbing oil to allow more naphthalene (11-12% in 1st quality, and elimination of it as a rejecting parameter for 2nd quality). References 5 (Russian).
[169-12131]

UDC 662.74 : 547.56 : 661.717

PRINCIPLES OF DISTRIBUTION OF NITROGEN BASES IN RECTIFICATION PRODUCTS OF COAL-TAR PHENOLS

Moscow KOKS I KHIMIYA in Russian No 3, Mar 82 pp 36-39

MARKUS, G. A., TERENT'YEV, V. Kh. and KIRSANOVA, V. S., Phenol Plant

[Abstract] The process of removing phenols from coal-tar is described, along with the complexities of nitrogen base distribution due to the interaction of phenols and those bases. To study this distribution, special samples from controlled plates were taken, along with samples from the supply plate, from residue and from the steam phase of

distillation. Gas-liquid chromatography and perchloric acid titration in an anhydrous medium showed that in the phenol column, nitrogen bases practically do not distil with phenol, but concentrate in the residue. In o-cresol, dicresol and xylenol columns, nitrogen bases distil off in part as azeotropes containing o-cresol and in part remain in the residue. Process variations, such as of temperature and pressure, bring changes in these distributions. Maximum elimination of bases from dicresol can be achieved by adding a column after the o-cresol column, where with reduced vacuum the o-cresol fraction can be obtained with less than 2% nitrogen bases. Figures 4; references 6 (Russian).
[169-12131]

UDC 620.97

FUEL ECONOMY: THERMOCHEMICAL REGENERATION AND NEW METHOD OF COAL GASIFICATION

Kiev VISNYK AKADEMIYI NAUK UKRAYINS'KOYI RSR in Ukrainian No 2, Feb 82 pp 47-49

NOSACH, V. H., candidate of technical sciences

[Abstract] Heat regeneration and coal gasification are two means of increasing the efficiency of utilizing fossil fuel resources. Two methods of heat regeneration are discussed: air regeneration and a new method, thermochemical regeneration. Use of thermochemical regeneration in heat-utilizing aggregates has increased fuel efficiency by 15-20%, and the combined use of both heat regeneration methods is also highly effective. The increased use of coal is generally associated with greater air pollution. The most effective method of controlling harmful atmospheric emissions by coal-fueled power plants is a two-stage combustion system with preliminary coal gasification to remove sulfur and ash and combustion of the pure gasification products. But the introduction of coal gasification has created the need for designing new gas generators. The advantages of using coal gasification at electric power plants include increasing the reliability of steam generators, decreasing expenditures for transporting fuel, and more complete utilization of coal. Coal gasification also broadens the use of low-quality coal. Gasification of Siberian coal with the production of synthetic natural gas also lessens the problem of transporting energy resources from Siberia to central regions of the USSR. A continuous method has been developed for producing synthetic gas by steam gasification of coal without use of oxygen. References: 9 (Russian).
[139-9307]

FERTILIZERS

UDC 631.851

PHOSPHORITE FERTILIZER AS PROMISING ACID-FREE FORM OF PHOSPHORUS FERTILIZERS

Moscow KHIMIYA V SEL'SKOM KHOZYAYSTVE in Russian No 2, Feb 82 pp 3-6

BORISOV, V. M., professor, and KRASIL'NIKOVA, N. A., professor, Scientific Research Institute of Fertilizers and Insectofungicides imeni Ya. V. Samoylov

[Abstract] Phosphorus fertilizers play an important role in agriculture and its impact on world's economy. They are obtained exclusively from natural phosphorite. One of the most important scientific and economical problems is the production of phosphorus fertilizers without consumption of sulfuric acid. For this reason new deposits of phosphorite in Siberia and in Middle Asia is most desirable. The use of phosphorite fertilizer should be expanded, this being the fastest and most practical way of increasing soil fertility. The effectiveness of phosphorite fertilizer depends to a large extent on its particle size. Since, powdered minerals create problems in their application this fertilizer should be used in granulated form. There are several large scale deposits of crude phosphorite which could be used to increase the production of these fertilizers. No references.
[156-7813]

UDC 631.84

EFFECT OF NITRIFICATION INHIBITORS ON MICROBIOLOGICAL ACTIVITY OF SOIL AND TRANSFORMATION OF FERTILIZER NITROGEN

Moscow KHIMIYA V SEL'SKOM KHOZYAYSTVE in Russian No 2, Feb 82 pp 14-16

SEMENISHEN, N. G. and KARBOVSKAYA, A. V., Uladovo-Lyulinetsk Experimental-Selection Station

[Abstract] Effectiveness of mineral fertilizers depends on the development of biological processes in the soil. Denitrification is but one of a series of examples where nitrogen is lost after application of a fertilizer. To

prevent these nonproductive losses, nitrification inhibitors have been successfully used in the past. The effect of "Dzhakos"--a Soviet nitrification inhibitor--on the microbiological activity of soil, on nitrogen dynamics and on the production of sugar beets during 1977-1979 has been studied. The inhibitor appeared to affect the activity of bacteria rather than their total number. Against other microorganisms "Dzhakos" showed no toxic activity. Its biological activity lasted about six weeks. As a result, the yield of sugar beets increased by 26-32 hundredweight per hectare. References 6 (Russian).
[156-7813]

UDC 546.185

DICALCIUMPHOSPHATE CONVERSION WHEN DISSOLVED IN WATER

Alma-Ata IZVESTIYA AKADEMII NAUK KAZAKHSKOY SSR: SERIYA KHIMICHESKAYA in Russian No 1, Jan-Feb 82 (manuscript received 21 Jul 80) pp 68-71

KOROTEYEVA, N. Ya. and URIKH, V. A., Institute of Chemical Sciences, KaSSR Academy of Sciences, Alma-Ata

[Abstract] The effects of pH and temperature on the speed and nature of dicalcium phosphate conversion when dissolving in water were studied. Temperatures and pH factors were close to those found as fertilizers dissolve in the soil under natural conditions; initial, intermediate and final products were determined by chemical, X-ray-structure and crystallooptical analyses. The most stable compound in the CaO--P_2O_5--H_2O system, and the final product of phosphate hydrolysis, was hydroxylapatite. Diffusion limited the activity of the chemical constituents of the initial compound. When dicalcium phosphate was dissolved in an alkaline medium, the pH gradually fell to the 6--6.5 range found when the compound was dissolved in an acid or neutral medium. Thus the solution that resulted had a buffering effect. In alkaline and neutral media, hydrolysis continued until hydroxylapatites formed, while in acid media it continued until the formation of calcium monophosphate. Figures 4; references 8: 6 Russian, 2 Western.
[160-12131]

UDC 541.123.6 + 546.226.32 + 546.229.39 + 546.185.325

SOLUBILITY IN FOUR-COMPONENT SYSTEM K_2SO_4--$(NH_4)_2SO_4$--P_2O_5--H_2O AT 80° C

Alma-Ata IZVESTIYA AKADEMII NAUK KAZAKHSKOY SSR: SERIYA KHIMICHESKAYA in Russian No 1, Jan-Feb 82 (manuscript received 30 Sep 81) pp 71-74

KAIPOVA, Z. K., LITVINENKO, V. I. and BEKTUROV, A. B., Institute of Chemical Sciences, KaSSR Academy of Sciences, Alma-Ata

[Abstract] An isothermal method consisting of adding a fourth component at nonvariant points in a triple system, was used to study mutual solubility in the title four-component system. This study was to determine the solubility of a chlorine-free fertilizer which would simultaneously supply N, P and K. The three-component starting systems were i) K_2SO_4--P_2O_5--H_2O; ii) $(NH_4)_2SO_4$--P_2O_5--H_2O; and iii) K_2SO_4--$(NH_4)_2SO_4$--H_2O. In i) and ii) the sulfates react with phosphoric acid to form potassium and ammonium hydrosulfate-dihydrophosphate; in iii) solid solutions of potassium and ammonium sulfates. The composition of solid phases was determined by chemical, crystalloptical and X-ray-phase analysis. Two nonvariant points of mutual crystallization of three salts--variants each containing N, P and K--were determined. Figures 3; references 9: 8 Russian, 1 English.
[160-12131]

UDC 662.74.002.5 : 66.099.2

METHODS FOR GRANULATING CHEMICAL PRODUCTS IN LIQUIDS

Moscow KOKS I KHIMIYA in Russian No 3, Mar 82 pp 46-48

KHUSTOCHKIN, P. P., Khar'kov Polytechnical Institute, SIMONOV, N. F. and SHKODKIN, V. G., KBAiM [expansion unknown--perhaps, Design Bureau for Automation and mechanization] of the State Institute for Planning of Establishments of the Byproduct Coke Industry

[Abstract] Considering that the most rapid cooling and granulation of nitrogen fertilizers occurs when a liquid coolant is used, but immediate entry into the liquid causes poor granulation, a new process was developed in which various compounds to be granulated could be injected into a tower in which a two-phase foam suspension causes spherical granules to form, instead of the scaly products obtained when chemical compounds strike a flat liquid surface. The system was tested at the Stakhanovsk Coal-Tar Byproduct Plant for indene-coumarone resins. By providing "soft" passage through the highly gaseous foam, positive results were obtained in preventing granule deformation. Figure 1; references 11: 10 Russian, 1 English.
[169-12131]

UDC 622.364.1 : 631.893

PROCESSING PHOSPHORITES OF KHUBSUGUL' DEPOSIT INTO COMPLEX CONCENTRATED FERTILIZERS

Moscow KHIMICHESKAYA PROMYSHLENNOST' in Russian No 2, Feb 82 pp 91-92

YAROSH, Ye. B., DMITREVSKIY, B. A., DMITRIYEVA, N. V., KOPYLEV, B. A., ZAIKINA, L. I. and TOKAREV, G. I.

[Abstract] Khubsugul' phosphorites, consisting of calcium phosphate, dolomite and calcite carbonates and quartz, were dissolved in phosphoric and nitrogen acids. The solubility of the CaO--P_2O_5--H_2O system formed was assayed to determine the degree of phosphorite dissolution. Results indicated that the degree to which the basic components of the phosphorite entered the liquid phase depended on the specifications and concentration of the acids used, and not on dissolving temperature. Best results were obtained with a solution containing mass percentgges of the following substances: 6.0% P_2O_5, 10.7% HNO_3, 0.9% MgO, and 0.4% CaO. It was possible to obtain the desired complex concentrated fertilizers by using an ecologically-closed method, without sulfuric acid. Figures 4; references 10 (Russian).
[168-12131]

UDC [620.197.2:66.061.3.023].661.634

UTILIZING EXTRACTORS WITH ANTICORROSION PROTECTION

Moscow KHIMICHESKAYA PROMYSHLENNOST' in Russian No 2, Feb 82 pp 102-104

DOBROLYUBOV, V. V., KALINICHENKO, V. A., ILYUKHIN, A. S., BUGAYENKO, N. N., STOLYAR, A. I., RADZEVICH, V. E. and LYUBANOVSKIY, V. D.

[Abstract] Studies of mineral fertilizer extractors working in a corrosive medium containing 28-32% P_2O_5, 1-5% sulfuric acid and 1-5% fluorine at temperatures of 70-75° C showed the most likely failure occurs in the lining at the base and under the mixing blade, along with corrosive damage to the cover. Various protective plates were tried on metallic and iron-concrete extractors seeking domestic products that would lengthen operational life before overhauls. The welds at the bottom seams where the protective plates were attached also proved to be of short service. It was recommended that paddle mixers be replaced by propeller or turbine devices, and that acid-resistant ceramic materials be used for protective blocks. Studies of new materials for covers indicated that new polymer materials, such as "Polan," should be used for lining covers. Together with "Furankor" cement, this latex can help reduce the need for importing such products.
[168-12131]

UDC 661.53.023.002.237

TECHNICAL AND ECONOMIC QUESTIONS FOR INCREASING OPERATIONAL EFFECTIVENESS OF LARGE SCALE PLANTS FOR PRODUCING AMMONIA

Moscow KHIMICHESKAYA PROMYSHLENNOST' in Russian No 2, Feb 82 pp 119-122

KIRYUSHKIN, V. M., KAZHDAN, Ye. Z., SEMENOV, V. P. and SOSNA, M. Kh.

[Abstract] Increased efficiency and ecological advances have come with use of natural gas, gas centrifuges and air cooling in producing ammonia. Technical stoppages continue to plague ammonia plants, thus reducing production and wasting raw materials. At some Soviet plants regular inspection and maintenance has made it possible to cut down time from 10% the first year to 4% the second, and 1.4% the third year of operation. Improvements in temperature stabilization at the reforming stage of processing have made possible reductions in natural gas consumption; at the "New Moscow Nitrogen" plant, testing led to establishing a steam : gas ratio of 4.0 as the optimum for efficient operation. Figures 3.
[168-12131]

UDC: 631.81.036

HYGIENIC ASPECTS OF FERTILIZER USE IN AGRICULTURE

Moscow KHIMIYA V SEL'SKOM KHOZYAYSTVE in Russian No 3, Mar 82 pp 14-15

TIMOSHENKOVA, L. P. and PERELYGIN, V. M., professor, Moscow Oblast Planning and Research Station for Chemization of Agriculture; Institute of General and Communal Hygiene imeni A. N. Sysin, USSR Academy of Medical Sciences

[Abstract] Dangers of overfertilization are pointed out, including contamination of water supplies, introduction of excessive nitrogen, phosphorus, heavy metals and trace elements to soils and plants and recycling of nitrates and other substances through manure used as fertilizer. The authors call for theoretical studies and hygienic standardization of application of mineral and other fertilizers to agricultural areas, with determination of the stability of chemical substances in the soil, and of the permissible concentrations of chemical substances in the soil to assure that the soil will retain its self-purification properties. References 17: 15 Russian, 2 Western.
[177-6508]

UDC 541.124.7 + 547.53

FREE RADICAL REACTION MECHANISMS, PART 13: MECHANISM AND SELECTIVITY OF FREE RADICAL HALOGENATION OF ALKYLAROMATIC HYDROCARBONS WITH FLUOROALKYL SUBSTITUENTS

Leningrad ZHURNAL ORGANICHESKOY KHIMII in Russian Vol 18, No 2, Feb 82 (manuscript received 17 Feb 81) pp 365-373

DNEPROVSKIY, A. S., YELISEYENKOV, Ye. V. and MIL'TSOV, S. A., Leningrad State University imeni A. A. Zhdanov

[Abstract] Free radical helogenation of 1-fluoro-2-acylethanes (I) and 1,1,1-trifluoro-2-acylethanes with sulfuryl chloride and N-bromosuccinimide was investigated. An attempt was made to determine the mechanism of the chain transfer during SO_2Cl_2 chlorination. On the basis of experimental data it was concluded that the chain development in SO_2Cl_2 chlorination goes exclusively through the chlorine atom. Calculations of the relative rates of halogenation showed a good correlation between log K_{rel} and Brown's σ^+ constants. The change in selectivity found upon changing from one reaction series to another indicated an influence of two independent factors responsible for the reactivity of the system: polar effect of the substituents and changes in the dissociation energy of the C-H bond. A single function between the reactivity and selectivity can be expected only in those cases when both the reactivity and selectivity are controlled by varying a single characteristic of a substrate. References 24: 7 Russian, 17 Western.
[161-7813]

UDC 547.533+547.295.1

FREE RADICAL REACTION MECHANISMS, PART 14: SELECTIVITY OF FREE RADICAL CHLORINATION OF VALERIC ACID DERIVATIVES USING ARYLCHLOROIODINIUM CHLORIDES

Leningrad ZHURNAL ORGANICHESKOY KHIMII in Russian Vol 18, No 2, Feb 82 (manuscript received 17 Feb 81) pp 373-377

DNEPROVSKIY, A. S. and KRAYNYUCHENKO, I. V., Leningrad State University imeni A. A. Zhdanov

[Abstract] Studying the polar effects in free radical substitution reactions, the selectivity of radical chlorination of C_4H_4Y with

arylchloroiodinium chlorides $XC_6H_4ICl_2$ was studied (where X = p-$C(CH_3)_3$, H, m-CF_3, m-NO_2 and Y = $COOCH_3$, COCl, CN and Cl). The reactions were carried out in sealed ampules at 30°C using photochemical initiation. The chlorination occured primarily along the secondary C-H bonds. The reactivity of these bonds increased as the distance from the electronegative substituent increased. The reaction was accelerated with electron donor substituents, the electrophilicity of this process being higher than that in chlorination with atomic chlorine. References 12: 8 Russian, (3 by Western authors), 4 Western.
[161-7813]

UDC: 183.24 : 549.67

ADSORPTION OF URANYL IONS BY MORDENITE AND CLINOPTILOLITE

Leningrad RADIOKHIMIYA in Russian Vol 24, No 1, Jan-Feb 82
(manuscript received 3 Feb 81) pp 9-13

ANDREYEVA, N. R. and CHERNYAVSKAYA, N. B.

[Abstract] A study is presented of the adsorption of uranyl by mordenite and clinoptilolite, as well as its influence on adsorption of cesium and strontium radionuclides by these zeolites. The adsorption of uranyl was studied under static conditions and under dynamic conditions with a contact time of forty minutes. The isotopes used in the study were purified of decay products by diethyl ether extraction followed by peroxide precipitation. The studies showed adsorption by both zeolites. Equilibrium was established in seven to fourteen days. The substances can therefore be used to purify solutions containing uranyl of cesium and strontium radionuclides. Figures 4; references 8: 6 Russian, 2 Western.
[176-6508]

UDC: 669.882; 621.039.325

KINETICS OF SORPTION OF URANIUM (VI) FROM FLUORINE-CONTAINING AMINOPHOSPHATE SOLUTIONS BY AMPHOLITES

Leningrad RADIOKHIMIYA in Russian Vol 24, No 1, Jan-Feb 82
(manuscript received 11 May 81) pp 14-18

PAKHOLKOV, V. S. and RYCHKOV, V. N.

[Abstract] A study is made of experimental and theoretical data on the kinetics of sorption of uranium ions from UO_2F_2 solutions containing HF and NH_4F by a number of aminophosphate ampholites. The ampholites ANKF-2B, ANKF-3G and ANKF-80 were used in their H^+-Cl^- forms. The influence of ionite grain size, agitator rotation speed, compound concentration and temperature on the rate of the process was established. The aminophosphate

ampholites were found to have high sorption rates, a result of the mutual influence of acid and base groups on the degree of ionization. The contribution of complex formation reactions does not change the nature of intradiffusion kinetics of sorption of the uranium ions from the fluorine-containing solutions. Figures 5; references 12 (Russian).
[176-6508]

UDC: 542.61

PHYSICAL DISTRIBUTION OF EXTRACTION AGENTS AND EXTRACTED COMPOUNDS BETWEEN AQUEOUS SOLUTIONS AND VARIOUS DILUENTS, PART 3: DISTRIBUTION OF DIALKYLPHOSPHORIC ACIDS, BETA DIKETONES AND EXTRACTED METAL-CONTAINING COMPOUNDS

Leningrad RADIOKHIMIYA in Russian Vol 24, No 1, Jan-Feb 82
(manuscript received 16 Dec 80) pp 22-24

SHMIDT, V. S., RYBAKOV, K. A. and RUBISOV, V. N.

[Abstract] The purpose of the present study was to evaluate the applicability of equations (of the type $\lg P_0 = \alpha + \beta VR^*$) derived in previous work to describe the dependences of the physical distribution constants (of acid extracting agents such as dibutylphosphoric, diamylphosphoric, dihexylphosphoric and dioctylphosphoric acids, beta-diketones, acetylacetone and benzoylacetone and certain extracted compounds of acetylacetone with metals). on the nature of the organic diluent. The study was based on published experimental data on distribution of compounds as well as chelates formed by acetylacetones with zinc, beryllium, copper (II) and uranium (VI). The results confirm the effectiveness of the concept of consolidation of the information on extraction equilibria using equations based on linear free energy relationships. Figures 3; references 11: 8 Russian, 3 Western.
[176-6508]

UDC 547.007:546.23

SYNTHESIS, STRUCTURE AND PROPERTIES OF COMPOUNDS WITH CHALCOGEN-NITROGEN BONDS, PART 4: Se-ARYL, Se-BENZOYL-N-PHENYLSULFONYLSELENIMIDES

Leningrad ZHURNAL ORGANICHESKOY KHIMII in Russian Vol 18, No 2, Feb 82 (manuscript received 23 Apr 81) pp 259-265

NADDAKA, V. I., KRASNOV, V. P., POPOVA, L. L. and MINKIN, V. I.,
Scientific Research Institute of Physical and Organic Chemistry;
Rostov-na-Donu State University

[Abstract] A series of Se-aryl and Se-benzyl-N-phenylsulfonylselenimides was synthesized by reacting equimolar quantities of acylbenzylselenide and tert-butylhypochlorite in $CHCl_3$ followed by addition of N-sodium derivatives of benzylsulfonamide. The IR, UV and PMR spectra of these compounds were analyzed in detail. These compounds are bipolar structures with a strong positive charge on the selenium atom, facilitating strong resonance interaction and a strong batochromic shift in the UV system. Determination of pK_a values indicated that these compounds are quite basic, comparable to araldaniles. PMR data indicated a high threshold of inversion for selenium pyramide in N-phenylsulfonylselenimides. Figures 5; references 11: 4 Russian, 7 Western.
[161-7813]

ORGANOPHOSPHORUS COMPOUNDS

UDC 547(569+241)+543.226

SYNTHESIS OF SOME THIOPHOSPHINIC ACID ESTERS AND INVESTIGATION OF THEIR THERMAL STABILITY

Baku AZERBAYDZHANSKIY KHIMICHESKIY ZHURNAL in Russian No 5, Sep-Oct 81 pp 33-37

MAMEDOV, F. A., MAMEDOV, F. N.,and MIRZOYEVA, M. A., Institute of the Chemistry of Additives

[Abstract] The goal of the present study was to synthesize aryl-, cyclohexyl-, chlorocyclohexylthiophosphines and to investigate their thermal stability. These products were obtained by reaction of respective trichlorophosphines with thiophenols and aliphatic mercaptans. The thiophosphines obtained are transparent liquids resistant to the action of moisture. Analysis of thermal stability showed the following order of activity: ⌬$-CH_3 > C_8H_{17} > -$⌬$-iso-C_3H_7$. When the substituents at the sulfur atoms were considered, introduction of chlorine was found to lead to a sharp drop in thermal stability. Chlorocyclohexylthiophosphines were as stable as chlorocyclohexylphosphines. Oxygen containing compounds differed markedly from their sulfur analogues only in the very early stages of decomposition (oxygen derivatives were than more stable), but as the temperature rose, their properties became the same. Figure 1; references 2 Russian, (1 by Western author).
[167-7813]

UDC 542.91:547.1'118

ORGANOPHOSPHORUS ANALOGUES OF BIOLOGICALLY ACTIVE COMPOUNDS, PART 11: SYNTHESIS OF ACYLPHOSPHATE ANALOGUES BASED ON METHYLENEDIPHOSPHONATES

Moscow IZVESTIYA AKADEMII NAUK SSSR: SERIYA KHIMICHESKAYA in Russian No 2, Feb 82 (manuscript received 4 Jun 81) pp 402-404

TARUSOVA, N. B., NOVIKOVA, Z. S., PRISHCHENKO, A. A., YAKOVLEVA, G. M. and KHOMUTOV, R. M., Institute of Molecular Biology, USSR Academy of Sciences, Moscow; Moscow State University imeni M. V. Lomonosov

[Abstract] Equimolar quantities of methylenediphosphonates and aldimine, $Ph_2CHN=CHCHMe_2$ reacted at 100°C in presence of Et_3N yielded

1-methyl-2-aminopropyl-2-phosphinomethylene- and -phosphinomethylenemethylphosphonic acids. In presence of dicyclohexylcarbodiimide, these analogues could be selectively esterified with protected adenosine to yield respective P_β-adenosinyl esters. References 6: 3 Russian, 3 Western (1 by Russian authors).
[165-7813]

UDC 542.91:547.1'128'118

SYNTHESIS AND PROPERTIES OF HEPTAMETHYLCYCLOTETRASILOXANOMETHYLPHOSPHONIC ACID DERIVATIVES

Moscow IZVESTIYA AKADEMII NAUK SSSR: SERIYA KHIMICHESKAYA in Russian No 2, Feb 82 (manuscript received 10 Jul 81) pp 404-408

GODOVIKOV, N. N., POLYAKOVA, L. A., KIREYEVA, Ye. G. and KABACHNIK, M. I., Institute of Heteroorganic Compounds imeni A. N. Nesmeyanov, USSR Academy of Sciences, Moscow

[Abstract] Reaction of sodium dialkylphosphite with bromomethylheptamethylcyclotetrasiloxane yielded a series of 0,0-dialkylheptamethylcyclotetrasiloxanomethylphosphonates which, when treated with oxalyl chloride, could be converted to 0-alkylheptamethylcyclotetrasiloxanomethylphosphonic acid chlorides (I). 0-ethylheptamethylcyclotetrasiloxanomethylphosphonic acid chloride was converted to 0-ethyl-0-(p-nitrophenyl)heptamethylcyclotetrasiloxanomethylphosphonate (II), a potent pesticide against rice weevil. When I was treated with SbF_3 in benzene, respective fluorides (III) were obtained in 44-59% yield, II and III were found to be potent irreversible inhibitors of cholinesterases. References 7: 5 Russian (1 by Western author), 2 Western.
[165-7813]

UDC 542.952.1:542.91:547.1'118:547.56:547.233.2

DIPHENOXYTHIOPHOSPHORYLIMIDOTRICHLOROPHOSPHATE, ITS THERMAL ISOMERIZATION AND ITS REACTIONS WITH PHENOL AND DIMETHYLAMINE

Moscow IZVESTIYA AKADEMII NAUK SSSR: SERIYA KHIMICHESKAYA in Russian No 2, Feb 82 (manuscript received 24 Jul 81) pp 465-468

KHODAK, A. A., GILYAROV, V. A. and KABACHNIK, M. I., Institute of Heteroorganic Compounds imeni A. N. Nesmeyanov, USSR Academy of Sciences, Moscow

[Abstract] Thermal isomerization of diphenoxythiophosphorylimidotrichlorophosphate (I) (8-10 hrs at 220°C) gave diphenyl(dichlorothiophosphorylimido)chlorophosphate (II), which upon reaction with phenol yielded

triphenyl(dichlorothiophosphorylimido)phosphate. Gradual replacement of Cl atoms in I was achieved by heating I with phenol. A 1:1 ratio of the reagents at 140-150°C led to replacement of one Cl atom; a 1:2 ratio of I to PhOH, at 170-180°C, replaced two chlorines and complete conversion to the triphenyl derivative occured at 180-200°C and a 1:3 ratio of I to PhOH. Reaction of I with dimethylamine taken at a 1:2 and 1:4 ratio also replaced one or two chlorine atoms yielding dimethylamido- and tetramethyldiamido(diphenoxythiophosphorylimido)dichloro-(or chloro)-phosphate respectively. To obtain hexamethyltriamido(diphenoxythiophosphorylimido)-phosphate, the above tetramethyldiamido homologue had to be reacted with 2-3 fold excess of dimethylamine. References 5 (Russian).
[165-7813]

UDC 542.91:547.1'118

REACTION OF PYRIMIDINYLPHOSPHITES WITH CARBOXYLIC ACIDS

Moscow IZVESTIYA AKADEMII NAUK SSSR: SERIYA KHIMICHESKAYA in Russian No 2, Feb 82 (manuscript received 25 Aug 81) p 475

GINIYATULLINA, M. A., PODZIGUN, G. I. and REZNIK, V. S., Institute of Organic and Physical Chemistry imeni A. Ye. Arbuzov, Kazan' Branch, USSR Academy of Sciences

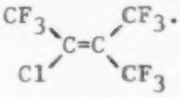
[Abstract] Dialkylpyrimidinylphosphites react with carboxylic acids at 20-35°C to yield corresponding acyloxyphosphites and 4,6-dialkyl-1,2-dihydropyrimidone-2. References 3 (Russian).
[165-7813]

UDC 542.91:547.464.5-312:547.1'118'161

WITTIG REACTION OF PERFLUOROACYL HALIDES AND ANHYDRIDES WITH HEXAFLUOROISOPROPYLIDENETRIETHOXYPHOSPHORANES

Moscow IZVESTIYA AKADEMII NAUK SSSR: SERIYA KHIMICHESKAYA in Russian No 2, Feb 82 (manuscript received 16 Oct 81) pp 477-478

VOLKONSKIY, A. Yu., ROKHLIN, Ye. M. and MYSOV, Ye. I., Institute of Metallorganic Compounds imeni A. N. Nesmeyanov, USSR Academy of Sciences, Moscow

[Abstract] A 45 day reaction of CF_3COCl with $(EtO)_3P=C(CF_3)_2$ (I) at 20°C gave a 19% yield of  However, CF_3COOEt, Ac_2O and Bz_2O did not with I even at 100°C, while $COCl_2$ reacted by splitting off the Cl atoms. References 3 (Western).
[165-7813]

UDC 661.68.456

CONTINUOUS PRODUCTION OF SILICON PYROPHOSPHATE OF REACTION PURITY

Moscow KHIMICHESKAYA PROMYSHLENNOST' in Russian No 2, Feb 82 pp 95-96

STARENCHENKO, V. G., KOSHCHEYEV, G. G., KOZEL', V. Ye., GAREYEV, A. M.
and MOKHOSOYEV, M. V.

[Abstract] A new method for obtaining silicon pyrophosphate based on drying an aerosil-phosphoric acid mixture is described. The laboratory set-up mechanically produced reaction-pure pyrophosphate with processing loss of 5-6%, requiring pulverization. X-ray-phase analysis showed a phase transformation from the initial silicon pyrophosphate from a low-temperature to a high-temperature, cubic modification, while thermal and thermogravimetric analyses indicated losses of about 18% during processing. The product consisted 30-40% of an acid salt and 60-70% of a normal salt, with crystalline structure a mixture of tetragonal and monoclinal modifications. Further heat processing at 900° and 1040° C led to a pure cubic modification with the composition $SiO_2 \cdot P_2O_5$. The experimental set-up could produce 10 tons of commercial product per year. Figures 2; references 7 (Western).
[168-12131]

UDC 632.952;633.11

TREATMENT OF SEEDS IN CONTROL OF WINTER WHEAT ROOT ROT

Moscow KHIMIYA V SEL'SKOM KHOZYAYSTVE in Russian No 2, Feb 82 pp 24-26

PIDOPLICHKO, V. N., candidate of biological sciences, Ukrainian Scientific Research Institute of Plants, and ANDREYEVA, Ye. I., doctor of agricultural sciences, All-Union Scientific Research Institute of Chemical Plant Protective Agents

[Abstract] During the period 1976-1980, field studies were carried out with a number of systemic and complex fungicides used to disinfect seeds about two weeks before the planting time. Two winter wheat brands were studied: Mironovskaya 808 and Poleskaya 70. The results showed that seed treatment with Bavistin, Fundozol, Vitavax, Vitathiuram, Khomay, Chloronizid-GP and Chloronizid-BP prevented to a varying degree development of cercosporiasis. No effect was noted against Ophiobolus graminis. References 6: 1 Russian, 2 Czech, 3 Western.
[156-7813]

UDC 632.951

PHYTOCIDIC ACTIVITY OF ETAPHOS AND ITS MIXTURES WITH FUNGICIDES

Moscow KHIMIYA V SEL'SKOM KHOZYAYSTVE in Russian No 2, Feb 82 pp 27-28

GAR, K. A., doctor of agricultural sciences, GUSHCHINA, N. I., candidate of agricultural sciences, KHOKHRYAKOVA, V. S., ROBAS, G. Ya., and BAKANOVA, S. M., candidate of chemical sciences, All-Union Scientific Research Institute of Chemical Plant Protective Agents

[Abstract] Etaphos is a new organophosphoric insectoacaricide produced in the USSR. Its phytocidic activity was evaluated on hydrangea leaves and in several orchards during the 1975-1979 period. Results show that emulsions of up to 0.2% of the 50% concentrate have practically no phytocidal activity on all cultures tested, except for beans. Etaphos mixed with other fungicides,

especially those containing copper, exhibited increased phytocidal activity exceeding the effect of the starting components alone. When applied during a dry season on apple trees, such mixtures led to a defoliating effect. Caution is advised against indiscriminate mixing of etaphos with other fungicides. Figures 2; no references.
[156-7813]

UDC 632.951

TOXICITY OF APHICIDES AGAINST PEA APHIS AND COMMON SPRING GRAIN APHIS

Moscow KHIMIYA V SEL'SKOM KHOZYAYSTVE in Russian No 2, Feb 82 p 29

MIKHINA, N. G., All-RSFSR Scientific Research Institute of Plant Protection

[Abstract] Toxicological evaluation of a number of insecticides was carried out on common spring grain and pea aphids which had never been exposed to pesticides before. The following was the order of toxicity towards both aphids: Reldan > Metaphos > Malathion > Phozalon > Rogor > > Etaphos. Among the derivatives of carbaminic acid, the most effective were Pirimor and Croneton. Mecarbenyl was not effective, especially against the pea aphis.
[156-7813]

UDC 632.951

ETAPHOS USED TO CONTROL EUROPEAN RED MITE

Moscow KHIMIYA V SEL'SKOM KHOZYAYSTVE in Russian No 2, Feb 82 pp 29-30

AVAKYAN, A. A., candidate of biologica sciences, Armenian Institute of Agriculture

[Abstract] Etaphos was found to exhibit high initial toxicity against European red mite (Eriosoma lanigerum Hausm.) which was, however, short lasting. A triple application 5-6 days apart was necessary for etaphos to be effective. Phozalon used as a control was effective after a single application.
[156-7813]

UDC 632.454

PERSISTENCE OF HERBICIDES IN SOIL AND IN PLANTS

Moscow KHIMIYA V SEL'SKOM KHOZYAYSTVE in Russian No 2, Feb 82 pp 53-57

KAVOLIUNAITE, I. A. and MELAMED, B. V., candidates of agricultural sciences,
Vokė Branch of the Lithuanian Scientific Research Institute of Agriculture

[Abstract] The stability of 2,4-D, triazine preparations and linuron in plants and in soil varies considerably. A serious problem with 2,4-D is its accumulation in plants; the problem with herbicides is their long stability in soil and a danger of their washout into ground waters. The goal of this study was to investigate the persistence of 2,4-D in various plants and the washing out of simazin, prometrin and linuron from the soil. Experimental data showed that 2,4-D was not retained for any appreciable time in barley seeds but it did persist in corn and rye for 3-4 weeks. 2,4-D accumulated markedly in grass, its level depending on the dose and schedule of application. The washing out studies of long lasting herbicides showed that their penetration from the application area into neighboring sites was insignificant. The most important route for the removal of long lasting herbicides from the soil is their decomposition. It occurs at different rates. Prometrin and linuron break down faster than simazin. References 14: 7 Russian, 7 Western.
[156-7813]

UDC 66.065.5

CRYSTALLIZING CHLOROPHOS ON ROLLER CRYSTALLIZER WITH RIBBED SURFACE

Moscow KHIMICHESKAYA PROMYSHLENNOST' in Russian No 2, Feb 82 pp 106-108

PONOMARENKO, V. G., BEY, V. I., POTEBNYA, G. F., BELOMYTTSEV, S. N. and
TKACHENKO, K. P.

[Abstract] Calculations are presented for the crystallization of chlorophos on a cooled, slowly revolving roller with microscopic fractures that gather scales of the compound. This phenomenom was utilized by employing a ribbed roller to speed crystallization. The results indicated that kinetic factors influenced accumulation as heat moved from the crystallizing smelt to the cooled wall of the roller. Calculations for rollers of 1600 mm and 500 mm coincided with the experimental results using a 150 mm roller. Thus the ratios obtained can be applied in practical calculations for industrial devices. Figures 3; references 5 (Russian).
[168-12131]

UDC: 632.95.028

ZONING OF UKRAINIAN LANDSCAPES WITH RESPECT TO CAPABILITY FOR SELF PURIFICATION FROM PESTICIDES

Moscow KHIMIYA V SEL'SKOM KHOZYAYSTVE in Russian No 3, Mar 82 pp 23-25

SHOSTAK, L. B., Kiev Medical Institute

[Abstract] The self purification capacity of soils is determined primarily by their biological activity, usually estimated from the heterotrophic fixation of carbon dioxide gas, its liberation, the total quantity of microorganisms, potential nitrification capacity and capacity for other hydrolytic processes. The principle of landscape-biogeochemical and soil-climatic zonality was used to subdivide the territory of the Ukraine in terms of self purification capacity, considering the capabilities of the various areas to liberate themselves of organic industrial compounds and data obtained by various researchers on the behavior of pesticides in soils as a function of type, weather conditions and other factors. Areas with weak and very weak self purification capacity represent 38.2% of the total land area, areas with moderate capacity represent 25.3%, while areas of high and very high capability for self purification represent 36.5% of the land territory of the Ukraine. The intensive level of use of pesticides in the Crimean, Transcarpathian, Odessa, and Moldavian areas represents a threat of pollution to the territories processed, as well as the to the Bug, Ingul, Prut and Dnester rivers. Figures 5; references 8: 5 Russian, 3 Western.
[177-6508]

UDC: 632.954:543.544

GAS CHROMATOGRAPHIC ASSAY OF 2,4-D AND 2M-4C DERIVATIVES IN SOIL AS CHLOROETHYL ESTERS

Moscow KHIMIYA V SEL'SKOM KHOZYAYSTVE in Russian No 3, Mar 82 pp 57-58

BABKINA, E. I., candidate of chemical sciences, ALEKSEYEVA, L. B., FANASKOVA, T. P. and DIBTSEVA, A. V., Institute of Experimental Meteorology

[Abstract] A method is suggested for gas chromatographic determination of chlorophenoxyalkane acid group herbicides, intended for analytic monitoring of soil pollution. The addition of 1 to 2% acetone by volume to the extraction mixture, allowed a 20-30% increase in the degree of extraction of the herbicides from the soil. The influence of esterification conditions on the yield of esters was studied. The use of acetone as the solvent doubled the height of the cholorethyl ether peak in comparison to the use of ether, quadrupling it in comparison to the use of hexane. Reliability and reproducibility can be achieved only if the standard solutions are

chloroethyl esters obtained by esterification of dry residues by herbicide extracts applied to objects identical to those studied. The method suggested is now being used to analyze soil specimens from various regions of the Soviet Union to determine the desirability of monitoring soil pollution with these herbicides. Instructions for sample preparation, esterification, chromatography and safety techniques are outlined. References 6: 4 Russian, 2 Western.
[177-6508]

UDC 547.873 : 542.951

SYNTHESIZING ACYLATED (2'-HYDROXYETHYL)AMINO- AND (2'-AMINOETHYL)AMINOTRIAZINES-1,3,5

Riga KHIMIYA GETEROTSIKLICHESKIKH SOYEDINENIY in Russian No 2, Feb 82 (manuscript received 11 Feb 81) pp 260-263

SAPOZHINKOVA, Zh. Z., PROKOF'YEVA, A. F., KOROLEVA, T. I. and MEL'NIKOV, N. N., All-Union Scientific Research Institute of Chemical Plant Protection Substances, Moscow

[Abstract] To obtain biologically active compounds, chloracetylchloride was combined with (2'-hydroxyethyl)aminotriazines, and the resulting product was combined with chloroacetylchloride in acetone in the presence of potassium carbonate, yielding (2'-chloroacetoxyethyl)-aminotriazines-1,3,5. Infrared spectra of these compounds and proton magnetic resonance of NH protons showed acylation on the OH group. The active chlorine atom in this compound led to its reaction with potassium thiocyanate to produce (2'-thiocyanoacetoxyethyl)-aminotriazines-1,3,5 in a nucleophilic substitution. The nature of the acylating agent affected the length of reaction time of ethylenediamine with carboxylic acid ethyl alcohol. Chlortriazines reacted with monoacylethylenediamines in acetone at 40-50°C in the presence of sodium bicarbonate as the nitrogen chloride acceptor. Details of reactions and their evaluation are presented in an experimental section. References 6: 4 Russian, 2 English.
[171-12131]

UDC 547.495.2 : 542.91 : 665.753.2.038

SYNTHESIS AND STUDY OF ANTIOXIDANTS OF TYPE OF CARBAMIDE DERIVATIVES OF 2,6-DI-TERT-BUTYLPHENOL

Moscow NEFTEKHIMIYA in Russian Vol 22, No 1, Jan-Feb 82
(manuscript received 2 Jul 80) pp 82-85

GLEBOVA, Ye. V., VISHNYAKOVA, T. P., LEBEDEV, V. N. and RAGULIN, L. I., Institute of Petrochemical and Gas Industries imeni I. M. Gubkin, Moscow

[Abstract] Synthesis of new carbamide derivatives of 2,6-di-tert-butylphenol, including N,N-di-(3,5-di-tert-butyl-4-oxyphenyl)carbamoylchloride, and their subsequent condensation with amines, are described. 3,5-Di-tert-butyl-4-oxyphenylamine was boiled in toluene under argon and the product phosgenated at room temperature in the presence of triethylamine to obtain N,N-di-(3,5-di-tert-butyl-4-oxyphenylcarbamoylchloride. It reacts with aliphatic amines producing high yields of carbamide derivatives, but does not react with aromatic amines. Results showed that the radical at the nitrogen atom determined the antioxidant effectiveness of carbamide derivatives of 2,6-di-tert-butylphenol. The most effective compound for use with T-6 fuel was N,N-di-(3,5-di-tert-butyl-4-oxyphenyl)-N'-tert-butylcarbamide. Figure 1; references 8 (Russian).
[163-12131]

UDC [547.535.1 + 547.569.2] : 542.943 : 541.127 : 66.094.382

EFFECTS OF POLYPHENOLSULFIDE-TYPE ANTIOXIDANTS ON PROCESS OF OXIDIZING OF HYDROCARBONS

Moscow NEFTEKHIMIYA in Russian Vol 22, No 1, Jan-Feb 82
(manuscript received 1 Jun 81) pp 86-92

KASHKAY, A. M., FARZALIYEV, V. M., KULIYEV, F. A., KASAIKINA, O. T. and GAGARINA, A. B., Institute of Chemistry of Additives, AzSSR Academy of Sciences

[Abstract] Polyphenolsulfide [PPS] reactions with cumyl hydroperoxide and effects on cumene oxidation were studied. After synthesis, the tested

compounds were purified by adsorption chromatography and their purity verified by thin-layer chromatography. Cumene oxidation was determined by oxygen absorption at 60° C with an azobisisobutyronitryl initiator. PPS reaction with cumyl hydroperoxide was conducted in a chlorobenzene solution in a nitrogen atmosphere at 70-110° C. Cumyl hydroperoxide was determined to be thermally stable at 70-110°, until the addition of PPS, which brought thorough decomposition. Increased temperature speeded the reaction. Kinetic evidence indicates a multi-stage process. Study of PPS reaction with free radicals showed that it inhibited oxidation, particularly for 4-tert-butyl-2,6-di-(5"-tert-butyl-2'-oxyphenylthiomethylenethio)phenol and 4-tert-butyl-2,6-di-(5"-tert-butyl-2'-oxyphenyldithio)-phenol. PPS had long-lasting inhibiting effect. Figures 3, references 11 (Russian).
[163-12131]

UDC 678.742.3 : 66.095.262 ; 66.097

PROPYLENE POLYMERIZATION WITH CATALYTIC SYSTEM $TiCl_3$ + $(C_2H_5)_2$ AlCl + $C_2H_5AlCl_2$ + TETRAETHOXYSILANE

Moscow PLASTICHESKIYE MASSY in Russian No 2, Feb 82 pp 9-10

KASHIRINA, G. N. and VOLOSHIN, I. A.

[Abstract] The modifying effects of tetraethoxysilane on the catalytic system TiCl + diethylaluminum chloride and ethylaluminum dichloride were studied, including the hydrogen effect and ratio of components of the catalytic system on the polymerization rate of propylene, the isotactic index, and the physicomechanical properties of the polypropylene. After initial polymerization, the tetraethoxysilane was injected and the mix heated to 70° C. After cooling to room temperature, a calculated amount of diethylaluminum chloride in a hexane fraction was injected. Results indicated that the modifying additive did not reduce the polymer's isotacticity, but speeded polymerization and improved the mechanical properties of the polymer produced. Figure 1; references 6 (Russian).
[143-12131]

UDC 678.742.3-137.422 : 539

STRUCTURE AND PROPERTIES OF COMPOUNDS OBTAINED BY SUCCESSIVE POLYMERIZATION OF PROPYLENE AND ETHYLENE

Moscow PLASTICHESKIYE MASSY in Russian No 2, Feb 82 pp 12-14

POPOV, V. P., PANIN, A. L., DUVANOVA, A. P., ZARETSKAYA, Ye. M., BUDNITSKIY, Yu. M., KERBER, M. L. and AKUTIN, M. S.

[Abstract] Copolymer polypropylene and polyethylene materials were compared with mixtures of these polymers and with polypropylene-rubber compositions. Divinylstyrene with 10% rubber gives 6 times higher blow resistance than the initial polypropylene, and consequently it was chosen as the concrete material for comparison with mixed copolymers and with block-copolymers of polypropylene and polyethylene. Tests were conducted in a temperature

range of -160 to +150° C. It was found that new relaxational processes were found only for a polypropylene-copolymer ethylene-propylene composition, at -50° C. All tested materials showed low-temperature loss maxima analogous to the gamma-maximum of polyethylene. The cold resistance of PP-CEP and PP-divinylstyrene-30 was determined by the rubber phases present. Any chemical bond between PP and rubber molecules was regarded as unimportant in forming properties, but the lack of chemical bonds between PP and PE phases led to a sharp drop in desirable properties. Figures 3; references 19: 11 Russian, 7 Western, 1 (unknown).
[143-121 1]

UDC 678.01 : 536.7

EVALUATING THERMODYNAMIC STABILITY OF POLYMER COMPOSITIONS

Moscow PLASTICHESKIYE MASSY in Russian No 2, Feb 82 pp 15-17

CHALYKH, T. I. and TAGER, A. A.

[Abstract] Using the Gibb's theory that free energy is a function of the state of a system and is determined by the difference between initial and final states, the average free energy value for a mixture of two polymers was determined according to thermodynamic cycles. Theoretical premises are presented and then applied to mixtures of cellulose nitrate and polyvinylacetate and to each one separately. Electron microscopic data show these to be a single-phase system. This method of calculations was also applied to mixtures of cellulose acetate, polymethylmethacrylate with polybutylmethacrylate, cellulose acetate with cellulose nitrate, and polyvinylchloride with polymethylmethacrylate. Changes in supermolecular structure, limited accuracy and the heterogeneity of compositional materials offer problems in applying this method. Figures 2; references 13: 10 Russian, 3 Western.
[143-12131]

UDC 678.033 : 66.095.262

PROPERTIES AND PROCESSING POLYMERIZATION-FILLED COMPOSITIONAL MATERIALS

Moscow PLASTICHESKIYE MASSY in Russian No 2, Feb 82 pp 17-20

FRIDMAN, M. L., POPOV, V. L., SABSAY, O. Yu., GEVORGYAN, M. A. and TOPOLKARAYEV, V. A.

[Abstract] The use of low-cost, readily available natural substances as fillers for polymers is discussed in terms of adhesion, polymerization on the filler surface by catalysts, and other physical, mechanical and rheological

aspects. Studies were made of low pressure polyethylene and a concentrate of expanded perlite with a grafted linear polyethylene coating. Perlite content was varied from 0 to 50%. Deformation and durability properties were then evaluated during unidirectional stretching and compacting, under blows, through thermomechanical analysis and with a capillary rheometer. Physicomechanical properties included a durable mechanical linking of macromolecules with the filler, although during mechanical mixing the filler pores were practically blocked for the matrix. Viscosity was only slightly related to the method of introducing the filler. Hydrodynamic and elastic properties were better for the test group of compositions, which were made by diluting the low pressure polyethylene, than for the control compositions made by mixing the substances mechanically. The second group tended to clog the matrix as filler content increased and extrusion temperature decreased. The polymer coating formed in group 1 reduced the agglomeration of filler particles, thus decreasing the danger of clogging canals. Practical applications are suggested. Figures 4; references 22: 16 Russian, 6 Western.
[143-12131]

UDC 678.762.2-134.622-134.532.019.394.048

MAKING THERMOSTABLE ABS-PLASTICS

Moscow PLASTICHESKIYE MASSY in Russian No 2, Feb 82
(manuscript received 15 Apr 80) pp 21-22

KOLOSOVA, T. O., YEMEL'YANOVA, A. T., BLASHCHUK, A. L., KERZHKOVSKAYA, V. V., LOZOVSKAYA, T. A. and LOVYAGINA, L. D.

[Abstract] Non-volatile antioxidant tri-n-nonylphenylphosphite (poligard) was added to rubber latex during its synthesis, to ABS-copolymer at the synthesis stage, as an emulsion during coagulation of ABS plastic latex, and to ABS plastic powder during high speed mixing. Thermal stability of the products was then compared to production ABS plastics stabilized with ionol at the coagulation stage. A slight drop in the rate of synthesis was noted when the antioxidant was added to rubber latex, and quantities up to 1.5% had no effect on physicomechanical properties. The greatest stabilization effect came when the antioxidant was added during latex rubber synthesis, with no practical loss in blow resistance after aging at 80° C for 3000 hours. The tri-n-nonylphenylphosphite had little effect on thermostability when added at later stages of synthesis. Figures 2; references 9: 6 Russian, 3 Western.
[143-12131]

UDC 678.066.02

LINKING DURABILITY WITH FOUNDATION OF FILLED POLYMER COVERINGS

Moscow PLASTICHESKIYE MASSY in R ssian No 2, Feb 82 pp 46-47

BATISHCHEV, L. I., ZELENEV, V. G. and LEKHIKOYNEN, M. M.

[Abstract] A colloidal graphite was injected into polycaprolactam by dusting granules during mechanical mixing. This composition was applied to etched iron sleeves. The graphite content of the polycaprolactam was up to 10% of the polymer mass. Durability was tested by a tangential shift method at 300 mm/min. Increased cohesion at 240-260° C was attributed to increased motion of the polymer macromolecules, reduced viscosity and the formation of a fine spherulite structure in the presence of the filler. Higher temperatures brought breakdown of the polymer and volatile products were released causing blisters and flaws. Increasing the graphite caused reduced coating stress. The optimal temperature for centrifugal coating was determined to be 255-265° C with centrifugal pressure at 0.4-0.8 MPa. Figures 2; references 5 (Russian).
[143-12131]

UDC 678.742.2-197.424.01 : 539.3

IMPROVING MECHANICAL PROPERTIES OF LOW PRESSURE POLYETHYLENE

Moscow PLASTICHESKIYE MASSY in Russian No 2, Feb 82 p 59

POPOV, V. P., KANTOR, L. A. and DUVANOVA, A. P.

[Abstract] Commercial low pressure polyethylene and stereoregular polybutene produced on a test production set-up were combined using a laboratory rolling mill at 160°C. Viscosity limits under tension, cracking resistance, creep and density were then measured. It was found that as polybutene content increased (from 1 to 20%), viscosity under tension decreased while cracking resistance grew. The least creep was found with 10% polybutene; this concentration was determined to be optimal. References 6: 3 Russian, 3 Western.
[143-12131]

UDC 678.744.332-19.01 : 539

MODIFYING THREE-DIMENSIONAL OLIGOCARBONATE METHACRYLATE POLYMER

Moscow PLASTICHESKIYE MASSY in Russian No 2, Feb 82 pp 59-60

GRACHEV, A. V. and KISELEV, M. R.

[Abstract] Liquid rubbers were used to modify oligoestercarbonate methacrylate. Rubbers included polydivinylisoprene, butadiene with acrylonitryl links and carboxylate groups at the ends of the compound, and "SKN-30" rubber with carboxylate groups. The first two mixed poorly with the polymer, hence a monooleinate of polyoxyethylene sorbite was added to enhance blending. It was found that these first two rubbers reduced rigidity destructive tension when stretched and relative elongation, but deformation resistance was somewhat reduced as well. The polar "SKN-30" rubber caused but a slight drop in rigidity while increasing relative elongation from 2.6 to 4% although changing destructive stretching tension. References 3 (Russian).

[143-12131]

UDC 678.674'448-19 : 66.095.3 + 678.01 : 539.3

UNSATURATED POLYESTERS MODIFIED WITH NITROGEN-CONTAINING COMPOUNDS

Moscow PLASTICHESKIYE MASSY in Russian No 2, Feb 82 p 60

ASRAR, Dzh., SHMELEV, V. V., FEDOTOVA, O. Ya., KORSHAK, V. V., SLONIM, I. Ya., BRYSIN, Yu. P. and SMIRNOVA, T. A.

[Abstract] The effects of phenylhydrazine and hydrazides of benzoic and terephthalic acids were studied for the rate of forming polyethylenegycolmaleinaphthalate, its setting by oligoesteracrylates, and the properties of the final products obtained. Potentiometric titration was used to establish the correlation between reaction time and acidity. The high activity levels of the compounds tested was confirmed, in the order benzoic hydrazide > > phthalic hydrazide > terephthalic hydrazide. The latter's lesser effectiveness was related to poor solubility in the reactive mass. Improved polyester properties after modification were attributed to high fumarate activity in forming lateral bonds, and reduced likelihood of double glycol bonds, as compared to maleates.

[143-12131]

UDC 678.742.2.033.01 : 539.389

VISCOSITY AND RESILIENCE FACTORS OF COMPOSITIONS BASED ON FILLED POLYMERS [NORPLASTS]

Moscow PLASTICHESKIYE MASSY in Russian No 2, Feb 82 p 61

NIKITIN, L. N., GLAZUNOV, M. P., KISELEV, M. R., GEVORGYAN, M. A., SIVERGIN, Yu. M. and NOVOKSHONOVA, L. A.

[Abstract] Mechanospectroscopy was used to study viscosity and resilience properties of mechanical mixtures of low pressure polyethylene with perlite and norplasts. Perlite content ranged from 10 to 50%, while polymer content of the norplast was 12.3%. Two maxima were found for the logarithmic decrement dependency of damping on temperature for the materials. Low temperature peaks had the order low pressure polyethylene > norplast-based compositions > mechanical mixture. The high temperature peak was related to internal friction in the crystalline areas. Here the order was reversed, with norplasts 10° C higher than mechanical mixtures, apparently due to partial amorphization and increased defects in the polymer binder.
[143-12131]

REVIEW OF BOOK 'ADHESION DURABILITY'

Moscow PLASTICHESKIYE MASSY in Russian No 2, Feb 82 p 61

FILYANOV, Ye. M.

[Book "Adgezionnaya prochnost'" by V. Ye. Basin, Moscow, Izdatel'stvo "Khimiya", 1981, 208 pages]

[Abstract] The current state of a study of adhesive strength of the bonding of polymers is surveyed in this book of four chapters. The book describes a continuation of the research by Basin and A. A. Berlin ["Fundamentals of Polymer Adhesions"]. The first two chapters consider the effect of molecular reaction on the durability of adhesion and the roles of various factors in forming the adhesive contact. An earlier conclusion about the decisive role of interphasal molecular forces in adhesive strength is reconfirmed. Mechanical factors in adhesion and causes for failure of additive principles are related to polymer reactions with the foundation in Chapter three, while the final chapter presents a kinetic approach to describing adhesion properties. The reviewer suggests that more attention be paid in a subsequent edition to highly reinforced and filled systems.
[143-12131]

UDC: 678.033.01

DIRECTED REGULATION OF HIGHLY-FILLED POLYMER MATERIAL PROPERTIES

Moscow PLASTICHESKIYE MASSY in Russian No 3, Mar 82
(manuscript received 3 Aug 80) pp 10-11

STROYEVA, O. A., AKUTIN, M. S., SALINA, Z. I., EL'TEKOV, Yu. A. and
UKLONSKIY, D. A.

[Abstract] The valuable properties of oligomer plastics as binders in the production of highly-filled composite polymer materials has resulted in their extensive use. One effective method of decreasing residual stresses in such materials is the introduction of microquantities of substances helping to accelerate relaxation processes and form a more compact, uniform and less stressed supermolecular polymer structure. Highly-filled polymer materials based on carbamide binder and quartz sand filler were used, with 97-98 percent filler. The additives used were organosilicon block copolymers based on polyorganosiloxane and polyoxyalkylene. The properties of the composite materials produced were studied for various contents and types of oligomer additives. The introduction of the additives at 0.25-0.3 percent decreased residual stresses in the system by 40-50 percent, improving the properties of the products produced upon storing and use. Figures 3; references 3 (Russian).
[175-6508]

UDC: 678.046.364

NONWOVEN REINFORCING MATERIALS WITH IMPROVED PROPERTIES

Moscow PLASTICHESKIY MASSY in Russian No 3, Mar 82
(manuscript received 15 Oct 80) pp 11-12

NOVIKOVA, O. A., GAVRILYUK, N. N., SHOROKHOV, V. M. and GLUKHOVSKAYA, M. I.

[Abstract] The physical and mechanical characteristics of nonwoven glass fiber materials depend on fiber properties and the chemical nature of the binder. Binder compositions based on polyvinyl acetate dispersions have been developed to improve properties. The dispersions were modified by water-soluble polyester and aldehyde resins, as well as simple cellulose esters. The compositions were used to produce films and their water absorption, strength and deformation characteristics were determined. The greatest adhesion strength was achieved by a binder consisting of 1.5% PVA, 0.6% PN-M and 0.3% MC-100 methylcellulose, remainder water. The three-component binders significantly improve the physical and mechanical properties of the glass fibers and expand the area of their application.
[175-6508]

UDC: 687.742.2:661.185.1:537

INFLUENCE OF SURFACTANTS ON ELECTRIFICATION OF HPPE BY FRICTION

Moscow PLASTICHESKIYE MASSY in Russian No 3, Mar 82
(manuscript received 3 Mar 80) pp 13-14

BODROV, A. V., SAKOV, D. M., SHABANOVA, S. A., VASILENOK, Yu. I.
and LAGUNOVA, V. N.

[Abstract] A study was made of the influence of various surfactants on electrification of HPPE [high pressure polyethylene] by friction. Surfactant content was varied from 0.001 to 2.5% of the polyethylene mass. Cation active compounds and anion active compounds were used. The specific volumetric and surface resistivity, dielectric permeability and initial surface charge density were determined. The specimens were charged by rubbing them with a felt belt for twenty seconds at 6.42 cm/s, relative humidity 60±5%, temperature 22±2°C. Only the use of dialkyldimethyl ammonium was found to be effective in decreasing σ_0 and moving the peak of thermostimulated discharge across an air gap into a lower temperature area. Figures 3; references 8: 6 Russian, 2 Western.
[175-6508]

UDC: 678.5.033.01:539+532.135

PROPERTIES OF COMPOSITE NORPLAST MATERIALS

Moscow PLASTICHESKIYE MASSY in Russian No 3, Mar 82 pp 15-16

STAL'NOVA, I. O., POPOV, V. L., GEVORGYAN, M. A., BRIKENSHTEYN, A. A.,
ABRAMOV, V. V., MAKSIMOVA, T. V. and FRIDMAN, M. L.

[Abstract] A method has been developed for producing composite materials in the process of polymer synthesis. It consists of polymerization of the monomer brought to the surface of the filler particles by an activated complex catalyst. The filler is thus covered with a film of polymer firmly bonded to the surface, producing composites called norplasts in which the filler content varies over broad limits. One way of using norplasts containing up to 90% filler is to introduce them to the corresponding polymer to the required content of mineral filler, then process the composite produced by traditional methods. This should improve the compatibility of filler and base polymer, due to the identical nature of the polymer component of the norplast and the matrix and the more uniform distribution of filler. This article studies the physical-mechanical and technological properties of these new materials. Varying the content of the polymer component in the norplast can be used to regulate the properties of the composites produced. Foamed perlite breaks down significantly during processing. The new surfaces thus formed can interact with the basic

polymer, improving the physical and mechanical properties of the end product. Figures 4; references 6: 3 Russian, 3 Western.
[175-6508]

UDC: 678.5.01:539.3

MECHANICAL PROPERTIES OF CERTAIN POLYMER MATERIALS

Moscow PLASTICHESKIYE MASSY in Russian No 3, Mar 82 pp 22-23

GORNOV, V. N.

[Abstract] The strength and rigidity of solid polymer materials under short term loading were tested by bending and axial extension tests. Young's modulus was found to vary in a linear manner with tensile strength. The data produced can be used to predict the variation in deformation of polystyrene foam products as a function of stress. An index relating elongation to Young's modulus and tensile strength is produced which can be used for accelerated aging testing and to determine the service life of solid polymer materials. Figure 1; references 6 (Russian).
[175-6508]

UDC: 542.61 : 546.799.5/8

EXTRACTION AND CONCENTRATION OF TRANSPLUTONIUM ELEMENTS FROM NITRATE MEDIA BY OXIDES OF DIPHENYL [DIALKYLCARBAMOYLMETHYL] PHOSPHINE

Leningrad RADIOKHIMIYA in Russian Vol 24, No 1, Jan-Feb 82
(manuscript received 26 Mar 81) pp 31-37

CHMUTOVA, M. K., NESTEROVA, N. P., KOCHETKOVA, N. Ye., KOYRO, O. F. and MYASOYEDOV, B. F.

[Abstract] A series of new diphenyl [dialkylcarbamoylmethyl] phosphine oxides was synthesized in an effort to find optimal reagents for extraction of actinides from nuclear fuel processing wastes. The new compounds differ from compounds studied previously in that they contain a phosphinoxide group instead of a phosphonate group. The possibility of using two of the reagents for quantitative extraction and concentration of transplutonium elements from acid salt solutions was studied. The reagent best suited in terms of its capacity for extraction and subsequent purification was $(C_6H_5)_2$ $POCh_2CON(C_4H_9)_2$. Figures 6; references 7: 3 Russian, 4 Western.
[176-6508]

UDC: 621.039.327 : 546.98

INFLUENCE OF IRRADIATION ON EXTRACTION OF PALLADIUM FROM NITRATE SOLUTIONS BY TRIBUTYLPHOSPHATE

Leningrad RADIOKHIMIYA in Russian Vol 24, No 1, Jan-Feb 82
(manuscript received 20 Jun 81) pp 43-48

ZAGORETS, P. A., SMELOV, V. S., OCHKIN, A. V., CHUBUKOV, V. V., TVERDOVSKIY, A. N., KONDRAT'YEV, B. A. and KIRPIKOV, S. V.

[Abstract] A study is presented of the extraction of palladium from nitrate solutions by tributylphosphate in the presence of the most probable radiolysis solution, as well as the influence of irradiation, Benzene, m-xylene, nitric acid, sodium nitrite, uranyl nitrate and trilon B, as well as dodecane, hexene-1, octene-1, octene-2, dodecene-1,

alpha-nitroso-beta-naphthene, n-butanol, butyric acid and technical hydrogenated synthine were used. After extraction of palladium the solutions were tested for content of the metal by colorimetric analysis. The specific diluent was found to have little influence on distribution and extraction of palladium, so dodecane was used as the standard diluent to study the influence of concentration and nature of acid used to treat the organic phase before bombardment. The influence of several radiolysis products on extraction by 30% tributylphosphate was studied. Butanol, DBP, nitric and butyric acids were found to have practically no influence on palladium distribution. A study of the extraction of palladium from aqueous solutions containing 300g/l uranyl nitrate showed that this compound suppresses extraction of palladium even in the presence of 1-hexene, apparently by decreasing the concentration of the free extracting agent. Bombardment of the organic phase in enclosed vessels may result in an oxygen deficit in the solutions and, therefore, in predominance of the process of nitration over the process of oxidation. Figures 2; references 4: 2 Russian, 2 Western.
[176-6508]

UDC: 661.781.1

MONO-AND-DI-N-BUTYLPHOSPHATES OF CERTAIN METALS OF SIGNIFICANCE IN REGENERATION OF IRRADIATED NUCLEAR FUEL

Leningrad RADIOKHIMIYA in Russian Vol 24, No 1, Jan-Feb 82
(manuscript received 19 Feb 81) pp 56-63

SOLOVKIN, A. S.

[Abstract] Results are presented from studies performed in the Soviet Union over the past ten years to determine the composition, structure, formation conditions and solubility of mono- and di-n-butylphosphates of certain metals of significance in radiochemical technology. The metals studied included zirconium, iron, uranium, plutonium, thorium, americium, rare earth elements, and neptunium. The least soluble (in water and organic solvents) of all the compounds of metals with MBP and DBP studied are the zirconium mono- and di-n-butylphosphates. Fe^{3+} and Am^{3+} are slightly soluble in aqueous solution. The remaining compounds are satisfactorily soluble in moderately acid aqueous solutions of DBP and TBP with diluents. The results also indicate similarity of the chemical properties of zirconium and plutonium (IV). Thorium is not an analog of plutonium in this respect. References 24 (Russian).
[176-6508]

UDC: 541.49 : 546.791.6

INTERACTION OF URANYL IONS WITH AMINES INVOLVING DEACTIVATION OF EXCITED STATES IN AQUEOUS SOLUTIONS

Leningrad RADIOKHIMIYA in Russian Vol 24, No 1, Jan-Feb 82
(manuscript received 19 Feb 81) pp 83-87

YAKSHIN, V. V., KHOKHLOVA, N. L., KAZAKOV, V. P. and AFONICHEV, D. D.

[Abstract] A study was undertaken to determine whether there is any interaction between amines and the uranyl ion in aqueous solutions and, if complex formation occurs, what is the nature of the complexes and how are they related to the structure of the amines used in the process. Fluorescence of the solutions was measured on a spectrofluorimeter based on a monochromator. Luminescence was excited by light at 365 nm wave length produced by a mercury lamp and a monochromator. The lifetime of excited states was measured in an installation in which the exciting light was produced by a pulsed nitrogen laser. It was found that introduction of aliphatic amines to an aqueous solution of the uranyl ion effectively depresses fluorescence. The change in fluorescence intensity and uranyl ion lifetime in the excited state were used to calculate the extinction constants in sulfate solutions. The results indicate that there is chemical interaction between the uranyl ion and aliphatic amines in aqueous sulfate solutions. The basicity of the amine influences the donor capacity of ammonium salts, which then take active part in deactivation of the excited state of the uranyl ion by the formation of donor-acceptor complexes with the common sulfate ion in the coordination sphere of both cations. Amines in sulfate solutions are thus uranyl fluorescence inhibitors. Figures 2; references 10: 6 Russian, 4 Western.
[176-6508]

WATER TREATMENT

UDC 662.74 : 628.34

SEEKING METHODS TO INCREASE OIL REMOVAL FROM EFFLUENT WATERS

Moscow KOKS I KHIMIYA in Russian No 3, Mar 82 pp 41-42

BOYETSKAYA, K. P. and IOFFE, Ye. M., Zhdanov Coal-Tar Byproduct Plant

[Abstract] A study had shown that still residues of fatty acids from the Shchebekinsk Chemical Plant were inefficient in removal of oil from that plant's effluent waters. Hence spun glass filters were developed for use in a cooling jacket of 45 mm diameter through which the water was directed along a 440 mm-long filtering tube at a controlled speed. The filter did remove the oil; the filter was regenerated with benzene when its efficiency in removing oil fell below 50%. Better filtration came after treating the filter with benzene, and the benzene was then reused. In addition to the water purification, it was possible to redistil the oil-benzene mix, yielding a product similar to absorbing oil and components of "heavy benzene." [169-12131]

UDC 662.74 : 628.543.12

SYSTEMIC ANALYSIS OF WATERS FROM COAL CHEMISTRY PRODUCTION

Moscow KOKS I KHIMIYA in Russian No 3, Mar 82 pp 42-45

DYATEL, S. G. and TEYKHRIB, T. K., Eastern Scientific Research Institute of Coal Chemistry

[Abstract] As part of a broader work, this article describes methods for determining H_2S, HCN and free NH_3 in waste waters from coal chemistry industries. The work is a part of a broader program of assay of 8 components of the effluent water, the others being CO_2, NH_4^+, $S_2O_3^-$m organic bases and phenols. Steps for a proposed simpler procedure include separating systemic components, determining initial states related to chemical reactions, determining physical characteristics such as volatility, selecting suitable chemical reagents that will react with several components, controlling the overall chemical functions of the system and its subsystems, and simplifying and eliminating interference related to previously measured components. The

first products determined were the unstable sulfide, cyanide, and free ammonia. Features of the procedures such as pH levels and electrode selection are discussed in reaching the conclusion that the titrant $K_2[Hg(NCS)_4]$ should be used in potentiometer titration to determine H_2S, HCN and free NH_3 content; titration is accomplished in 10-15 minutes. Figures 4; references 12 (Russian).
[169-12131]

CSO: 1841 - END -

JPRS 81427

3 August 1982

USSR Report

CHEMISTRY

No. 87

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CHEMISTRY

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UDC 615.322 : 582.951.4 : 547.944.3].012.8

ALKALOID EXTRACTION FROM SCOPOLIA GRASS

Moscow KHIMIKO-FARMATSEVTICHESKIY ZHURNAL in Russian Vol 16, No 3, Mar 82 (manuscript received 8 Jan 81) pp 338-341

MININA, S. A., GROMOVA, N. A., FILIPIN, N. A., KOMOVSKIY, B. K., GVIRTS, M. V. and LOKSIN, B. A., Leningrad Chemical Pharmaceutical Institute; "Progress" Scientific Production Association, Leningrad

[Abstract] Continuing earlier research (reported in this journal, No 11, Nov 74, pp 56-60 and No 3, Mar 74, pp 135-137), the effectiveness of extraction equipment is summarized. The process begins with evacuation of air from the extraction chamber and hence from the plant material in the chamber by steam pressure, followed by injecting an extractant with rapid condensation, during which the extractant enters the plant cells. Repeated forced removal of extract from the plant material and refilling with extractant leads to convective diffusion during which medicinal substances are removed along with the extractant. Water soluble alkaloid salts were obtained in this manner with 98% yield in 30 minutes with the second, refined extraction system summarized, involving alternating vacuum and heating steps with evacuation stages. The results obtained with the latter system were used in further research seeking to obtain a more concentrated extract. Figures 2; references 6 (Russian).
[180-12131]

ANALYTICAL CHEMISTRY

UDC 541.127:546.18

REACTIONS LEADING TO FORMATION OF ATOMIC PHOSPHORUS

Moscow IZVESTIYA AKADEMII NAUK SSSR: SERIYA KHIMICHESKAYA in Russian
No 1, Jan 82 (manuscript received 25 Nov 80) pp 22-25

ALEKSANDROV, Ye. N., ARUTYUNOV, V. S., DUBROVINA, I. V. and KOZLOV, S. N.,
Institute of Chemical Physics, USSR Academy of Sciences, Moscow

[Abstract] The rate constants of phosphorus atom formation were studied in $H + PCl_3$ and $H + P_4$ reactions. Variation of the rate of heterogeneous decay of atoms was checked upon addition of small quantities of P_4 or PCl_3 to the flow. The rate constants of the heterogeneous decay of atoms were determined by variation of the flow velocity or introduction of a quartz rod described previously. The resonance fluorescent method was used under flow conditions in the temperature range of 300-670K to determine the rate constants. Atomic phosphorus was recorded in the products of the reactions in concentrations comparable to concentrations of the expended hydrogen atoms. Figures 2; references 9: 6 Russian, 3 Western.
[128-6521]

UDC 546.814

TIN HYDROXOORTHOPHOSPHATE AND HYDROXOORTHOARSENATE

Moscow ZHURNAL NEORGANICHESKOY KHIMII in Russian Vol 27, No 2, Feb 82
(manuscript received 2 Mar 81) pp 339-343

CHERNORUKOV, N. G., SIBRINA, G. F. and YEGOROV, N. P., Gor'kiy State
University imeni N. I. Lobachevskiy

[Abstract] Study of new compounds $Sn(OH)PO_4$ and $Sn(OH)AsO_4$ was conducted by infrared spectroscopic and roentgenographic and thermographic methods to establish their functional composition, structure and structural similarity. The compounds revealed an isostructure between them and are similar in structure to the known compound $Ge(OA)PO_4$. The crystallographic and infrared

spectroscopic characteristics of the compounds and the products of their thermal breakdown were determined in the temperature range of 20-1000°C. The behavior of $Sn(OH)PO_4$ and $Sn(OH)AsO_4$ upon heating confirms their functional composition and structure. Hydroxyortho-derivative compositions of $Sn(OH)XO_4$ in which SnO_6 octahedrons are linked in the chain along one of the fourth order axes and are combined into a crystal lattice by phosphate or arsenate tetrahedrons, exist in a number of tin hydroxoorthophosphates and hydroxoorthoarsenates. Figures 3; references 11: 4 Russian, 7 Western.
[132-6521]

UDC 541.49+546.972

INVESTIGATION OF CRYSTALLINE STRUCTURE OF $[Rh_2(H_2PO_4)_4(H_2O)_2]$

Moscow ZHURNAL NEORGANICHESKOY KHIMII in Russian Vol 27, No 2, Feb 82 (manuscript received 30 Apr 81) pp 417-423

DIKAREVA, L. M., SADIKOV, G. G., PORAY-KOSHITS, M. A., BARANOVSKIY, I. B., ABDULLAYEV, S. S. and SHCHELOKOV, R. N., Institute of General and Inorganic Chemistry imeni N. S. Kurnakov, USSR Academy of Sciences

[Abstract] X-ray diffraction study of $[Rh_2(H_2PO_4)_4(H_2O)_2]$ crystals showed that the complex has dimer structure with four bridge H_2PO_4-groups. The distance of Rh-Rh is equal to 2.487 (1) angstroms. The water molecules are in the axial position in trans-position to the Rh-Rh bond; $Rh - O_{H_2O} = 2.29$ angstroms and $Rh - O_{phos} = 2.04$ angstroms.
[132-6521]

UDC 546.23 + 536.77

FREE ENERGY OF POLYSELENIDE ANION FORMATION IN AQUEOUS SOLUTIONS

Moscow ZHURNAL FIZICHESKOY KHIMII in Russian Vol 56, No 2, Feb 82 (manuscript received 3 Mar 80) pp 431-433

GLADYSHEV, V. P. and DUBININA, L. K., Institute of Steel and Alloys, Moscow; Kazakh State University imeni S. M. Kirov, Alma-Ata

[Abstract] Free energies of polyselenide ions were calculated for various compositions based on literature data of thermodynamic characteristics of hexagonal selenium and its compounds. The most thermodynamically stable compound under normal conditions is the chain molecule Se_n and not atomic selenium. Based on the equation $\Delta G^o_{298} = \Delta H^o_{298} - \Delta TS^o_{298}$ and taking the ΔH^o_{298} and ΔS^o_{298} values for atomic selenium to be 0 and 42.5 J/mole respectively, the free energy of atomic selenium formation $\Delta G^o_{298}Se$ was calculated to be 12.66 kJ/mole. Based on this result, the ΔG^o_{298} values for Se_2^{2-}, Se_3^{2-}, Se_4^{2-} and Se_6^{2-} were calculated These calculated values agreed well with data from electrochemical experiments. References 12: 11 Russian (1 by Western author), 1 Western.
[162-7813]

UDC 549.943:666.233

OXIDATION AND GRAPHITIZATION OF DIAMOND AT LOW PRESSURE

Moscow ZHURNAL FIZICHESKOY KHIMII in Russian Vol 56, No 2, Feb 82 (manuscript received 7 May 81) pp 495-496

USPENSKAYA, K. S., TOLMACHEV, Yu. N. and FEDOSEYEV, D. V., Institute of Physical Chemistry, USSR Academy of Sciences, Moscow

[Abstract] Oxidation of synthetic diamond powders of varying granularity was studied at different pressures and temperatures (7-400 Pa and 600-1000°C). It was shown that fine powders exhibited surface graphitization along with oxidation at temperatures of 850°C. Coarser particles showed this phenomenon at a higher temperature, namely at 950°C and higher. The thickness of this carbonized layer increased rapidly with elevation of the oxidation temperature and was linearly related to the oxidation time. Figures 1; references 8: 5 Russian, 3 Western (1 by Russian authors).
[162-7813]

UDC 539.194:541.6:546.18

STRUCTURE AND CHEMICAL SHIFTS OF $\delta^{31}P$ PHOSPHAZOALKANES

Kiev TEORETICHESKAYA I EKSPERIMENTAL'NAYA KHIMIYA in Russian Vol 18, No 1, Jan-Feb 82 (manuscript received 18 Sep 81) pp 58-65

YEGOROV, Yu. P., KUDRYAVTSEV, A. A., PINCHUK, A. M., MARCHENKO, A. P. and KOVENYA, V. A., Institute of Organic Chemistry, UkSSR Academy of Sciences, Kiev

[Abstract] The values of chemical shifts of ^{31}P nuclei (δ_P) represent very informative characteristics of the structure of phosphorus-containing molecules. An attempt was made to develop a general empirical formula relating δ_P to structural characteristics of the phosphorus atom substituents. Phosphazoalkanes of the general formula $R_3P = NY$ were investigated, where $R = (Me_2N)_3$; $(Et_2N)_3$, $(Et_2N)_2CCl_3$, $(Et_2N)_2Cl$, $(CCl_3)_2Cl$ and $(CCl_3)Cl_2$ and Y = H, Me, Et, Pro, But, Hept, i-Pro and cyc-Hex. Progression in the direction listed of either of the substituents (while keeping the other constant) led to a shift of δ_P towards higher fields. A function was developed and constants were calculated relating these parameters. Finally, a formula was developed for the calculation of δ_P for $R_3P = NY$ compounds. The calculated values agreed reasonably well with experimentally determined ones. Figures 2; references 23: 12 Russian, 11 Western.
[164-7813]

UDC 541.49+546.(31+4/.5)

NMR STUDY OF STRUCTURE AND STABILITY OF DIBENZOMETHYLPHOSPHONYL-20-CORONA-7 COMPLEXES WITH ALKALI AND ALKALINE EARTH METAL IONS

Kiev TEORETICHESKAYA I EKSPERIMENTAL'NAYA KHIMIYA in Russian Vol 18, No 1, Jan-Feb 82 (manuscript received 3 Mar 81) pp 65-71

BIDZILYA, V. A., GOLOVKOVA, L. P., YATSIMIRSKIY, K. B., KESSENIKH, A. V., RYABOKOBYLKO, Yu. S. and SHMELEV, L. V., Institute of Physical Chemistry imeni L. V. Pisarzhevskiy, UkSSR Academy of Sciences, Kiev

[Abstract] The goal of this study was to investigate the effect of solvent polarity on the ability of heterofunctional macrocyclic polyesters MRS (dibenzomethylphosphonyl-20-corona-7) to form complexes with alkali and alkaline earth metal ions. This study was carried out by the NMR method in deuteroacetone, in which the perchlorates of these metals are completely dissociated. Addition of Li, Ca, Mg, Sr and Ba perchlorates to MRS solution resulted in shifts of all corona proton signals. Na^+ ions showed a different shift sequence, leading the authors to conclude that Na^+ formed a different complex than the other ions. The authors stated that Mg^{2+} and Ca^{2+} formed ML_2^{2+} type complexes, while Li^+, Na^+, Sr^{2+} and Ba^{2+} could form either ML^{2+} or ML_2^{2+} type complexes. Stability constants were calculated for Li^+, Na^+ and Ba^{2+} complexes with MRS. Figures 4; references 7: 4 Russian, 3 Western.
[164-7813]

UDC 66.547

NITROGEN OXIDE OUTPUT IN THERMOOXIDATIVE NEUTRALIZATION OF AMMONIA GAS

Kiev KHIMICHESKAYA TEKHNOLOGIYA in Russian No 2, Mar-Apr 82 pp 48-50

KOLIYENKO, A. G. and KARNAUKH, N. G.

[Abstract] Burning of effluent ammonia and other nitrogen-containing gases by thermooxidative neutralization leads to formation of increased amounts of nitrogen oxides in the atmosphere. Studies are reported here on methods of reducing the nitrogen oxide output at industrial facilities where effluent gases contain ammonia. Methods of reduction include recirculation of cooled combustion products, two-stage and tangential vortex burning and reduced air heating, but these are insufficient due to increased demands for elimination of noxious odors from toxic gases, increased complexity of installations, and required savings for neutralization of ammonia gas. Tests have shown that ammonia gas is the most difficult of several waste gases to burn off due to the minimum 800° C temperature required. The method proposed increases the amount of oxygen-containing waste gases in the furnaces of drying and

heat-generating installations. With delivery of excess amounts of oxygen, the temperature needed for complete neutralization of ammonia gas can be reduced and the costs of cutting nitrogen oxide output minimized. Figures 2.
[183-12131]

UDC 632.9o1 : 634.1/7 : 635.1

CHROMATOGRAPHIC DETERMINATION OF RESIDUAL AMOUNTS OF ORGANOPHOSPHOROUS PESTICIDES IN DRIED FRUITS AND VEGETABLES

Moscow ZHURNAL ANALITICHESKOY KHIMII in Russian Vol 37, No 3, Mar 82 (manuscript received 3 Apr 80) pp 494-498

ZALUTSKAYA, O. I. and SALASHINSKIY, N. A., Trade and Economics Institute, L'vov

[Abstract] Thin layer chromatography of sorbents was used to determine residues of metaphos, phosphamide and chlcrophos found jointly in dried potatoes, carrots, parsley, apples, pears and prunes. Samples of the indicated dried products were ground up and 10 mcg of the pesticides were mixed with 25 g of each as a control. Then test models were prepared of 150 g samples to which maximum permissible amounts of each pesticide were added, with n-hexane to insure equal distribution. After 5-7 days storage, 25 g samples were taken and compared to the control samples. Various extractants were used to separate the pesticides from the dried products. The most effective extraction was achieved by using a 30% solution of acetone in n-hexane, followed by purging of the extracts, separation, and qualitative and quantitative assay using thin layer chromatography. The minimum limits for identifying pesticide content were 1-5 micrograms. References 9: 5 Russian, 4 Western.
[185-12131]

UDC 661.886

OBTAINING WHITE ARSENIC BY OXIDIZING ARSENIC TRISULFIDE

Baku AZERBAYDZHANSKIY KHIMICHESKIY ZHURNAL in Russian No 6, Nov-Dec 81 pp 117-121

RZAYEV, B. Z. and SAYADOV, R. K., Nakhichevan Scientific Center, AzSSR Academy of Sciences

[Abstract] In order to obtain pure white arsenic after original production from arsenic-sulfur ores, the authors used a sulfide method to refine arsenic trisulfide obtained from the Darydag hot springs. 99.5%-Pure As_2S_3 was subjected to volatilization in oxygen in a reactor containing successive

platelike baffles. It was found that as temperatures surpassed 400° C, the degree of oxidation increased, reaching 99.57% between 500 and 600° C. Further temperature increases led to volatilization of arsenic trisulfide and a drop in its oxidation. Increased oxygen feed also reduced oxidation, so that constant delivery of oxygen totaling 2.25 liters brought complete oxidation at a rate of 1 ml/sec. In air the oxidation temperature for maximum results was set at 550° C at 4 ml/sec, using a total of 9.2 liters, and with an air/oxygen mix, the same temperature and an injection rate of 5.4 liters was regarded as optimal. No qualitative variations were noted with different types of oxidants. Figures 3; references 3 (Russian).
[186-12131]

UDC 615.357.453.012.6.002.62 : 547.92

PRODUCTS OF MICROBIOLOGICAL TRANSFORMATION OF 19-HYDROXYSITOSTEROL

Moscow KHIMIKO-FARMATSEVTICHESKIY ZHURNAL in Russian Vol 16, No 3, Mar 82
(manuscript received 10 Jun 81) pp 334-338

KOLYVANOVA, T. S., BAYUNOVA, V. I., GABINSKAYA, K. N., KOROBOVA, Yu. N.
and GRINENKO, G. S., All Union Scientific Research Chemical Pharmaceutical
Institute imeni S. Ordzhonikidze, Moscow

[Abstract] Seeking low-cost and readily available raw materials for synthesizing steroid hormones, the authors studied sitosterol (from wood-processing wastes) to determine features of its transformation into 3-acetate of 19-hydroxysitosterol, and of the further product estrone. To select the best conditions for growing necessary bacteria, a culture Protoaminobacter alboflavum was chosen, on which the maximum quantity of estrone was formed in 144 hours, with 55% yield from the initial 19-acetate at a temperature of 32° C. This yield was achieved by protection of the steroid skeleton from total destruction by the enzyme disintegration process. Details of synthesis of initial compounds and of culturing are presented in the experimental section. References 6: 2 Russian, 4 Western.
[180-12131]

UDC 547.21:542.97:66.094.222

FORMATION, PHASE COMPOSITION, TEXTURE AND CATALYTIC PROPERTIES OF Co-MgO-CALCIUM-ALUMINA CATALYSTS IN SYNTHESIS OF HYDROCARBONS FROM CO AND H_2

Moscow NEFTEKHIMIYA in Russian Vol 21, No 6, Nov-Dec 81
(manuscript received 22 Dec 80) pp 863-871

LAPIDUS, A. L., BRUK, I. A., MAL'TSEV, V. V., KHOANG CHONG IEM, YAKERSON, V. I., GOLOSMAN, Ye. Z., MAMAYEVA, I. A., KALACHEVA, N. B., DANYUSHEVSKIY, V. Ya. and NISSENBAUM, V. D., Institute of Organic Chemistry imeni N. D. Zelinskiy, USSR Academy of Sciences; Novomoskovsk Branch, State Scientific Research and Planning Institute of the Nitrogen Industry and Products of Organic Synthesis

[Abstract] The formation of cobalt and calcium-aluminum systems was studied and detailed investigation of them during synthesis of hydrocarbons from carbon monoxide and hydrogen was carried out. The formation of catalysts in which the components of calcium aluminates and basic cobalt and magnesium carbonates interact was studied. The carrier with developed surface and the active component on this surface are created during the reaction. The catalysts show maximum selectivity with respect to synthesis of liquid hydrocarbons from carbon monoxide and hydrogen with 65-84 percent restoration of the metal and dispersion by carbon monoxide chemosorption equal to $6 \cdot 10^{-3}$ to $10 \cdot 10^{-2}$. The yield of liquid hydrocarbons is maximum in the presence of 33Co-3MgO-64talyum treated with hydrogen at 550°C. Cobalt-magnesium oxide-calcium aluminate catalysts are active in synthesis of liquid hydrocarbons. References 17: 15 Russian, 1 Polish, 1 Western.
[95-6521]

UDC 547.56:66.095.253.73:542.971.3

EFFECT OF AMMONIA ON CATALYTIC PROPERTIES OF ZEOLITE-CONTAINING CATALYST AShNTs-3 IN ALKYLATION OF PHENOLS BY STYRENE

Moscow NEFTEKHIMIYA in Russian Vol 21, No 6, Nov-Dec 81
(manuscript received 2 Apr 81) pp 885-889

KOLESNICHENKO, N. V., KURASHEV, M. V., ROMANOVSKIY, B. V. and MENYAYLOV, A. A., Institute of Petrochemical Synthesis imeni A. V. Topchiyev, USSR Academy of Sciences; Moscow State University imeni M. V. Lomonosov

[Abstract] The effect of preliminary treatment with a mixture of ammonia and a small quantity of water vapor on the catalytic properties of the zeolite-containing catalyst AShNTs-3 was investigated. Preliminary treatment of the catalyst with an ammonia-water vapor mixture at 250°C for 2 hours results in a considerable increase in the yield of methylbenzylphenols and specifically of 2-(αmethylbenzyl)phenol. Treatment of zeolites with ammonia results in dealuminization of the zeolite body and the appearance of exchange aluminum on the catalyst surface after treatment with ammonia affects the selectivity of the catalyst with respect to formation of 2-(α-methylbenzyl)-phenol. The highest yield of methylbenzyl phenols is achieved at 250°C with no less than 4:1 molar ratio of phenol:styrene and at a volumetric rate of 5.5 hr^{-1}. Figures 1; references 9 (Russian).
[95-6521]

UDC 547.535.1:542.943.8:541.127:541.128.4

KINETICS AND MECHANISM OF CATALYTIC DEGRADATION OF CUMYL HYDROPEROXIDE UNDER ACTION OF SUBSTITUTED 5-TERT-BUTYL-2-HYDROXYPHENYLSULFIDES

Moscow NEFTEKHIMIYA in Russian Vol 21, No 6, Nov-Dec 81
(manuscript received 21 Jan 80) pp 898-905

KULIYEV, F. A., FARZALIYEV, V. M., DENISOV, Ye. T. and VORONKOV, M. G., Institute of the Chemistry of Additives, Azerbaijan SSR Academy of Sciences

[Abstract] Catalytic decomposition of cumyl hydroperoxide exposed to substituted hydroxyarylsulfides was investigated in the temperature range of 70-110°C. All eight substituted 2-hydroxyarylsulfides catalytically break down cumyl hydroperoxide. One molecule of the sulfide can break down several hundred to several thousand hydroperoxide molecules depending on the structure. The rate of catalytic decomposition of cumyl hydroperoxide is directly proportional to the inhibitor concentration and to the square of hydroperoxide concentration. The interaction products of methyl-(5-tert-butyl-2-hydroxyphenyl) sulfide with cumyl hydroperoxide are capable of breaking the chain of cumol oxidation repeatedly, up to 10-15 times. Figures 3; references 13: 9 Russian, 4 Western.
[95-6521]

CHEMICAL INDUSTRY

MANAGEMENT BLAMED FOR TURKMEN CHEMICAL PLANT CONSTRUCTION DELAYS

Ashkhabad TURKMENSKAYA ISKRA in Russian 24 Mar 82 p 2

[Article by V. Kazantsev, Communist Party Central Committee instructor, Turkmenistan: "The Price of Overall Supervision"]

[Text] Chemists and petroleum refiners have much to do in the 11th Five-Year Plan. A significant increase in output of mineral fertilizers, chemical raw material and different petroleum products is contemplated because of the development of operational capacities and the putting into service of new capacities. It is a matter of honor for labor collectives and party organizations to complete the renovation and construction of projects on schedule.

We are talking about the TZAU [Turkmen Nitrogen Fertilizer Plant], the Chardzhou Petroleum Refining Complex, PVS-350 [ground-air liaison post] of the Gaurdak sulfur plant and the moderated coking installation of the Krasnovodsk Petroleum Refining Enterprise. They now determine the basic volume of capital construction in these sectors of the economy.

The course of construction of projects is considered regularly at conferences of oblast staff meetings. Special attention is given to construction projects designated as major projects of the five-year-plan by the 26th CPSU Congress. In spite of this, we must report today that operations here are extremely unsatisfactory.

All general contracting trusts such as "Turkmenkhimstroy," "Marykhimstroy," "Gaurdakkhimstroy" and "Turkmenvostokneftestroy" and the sub-contracting trust "Turkmenkhimmontazh" are in debt to the state. These are alarming facts. Really, why have builders of the TZAU fulfilled only one-half of their plan? Why were the UZK-3 [expansion unknown] and the PVS-350 not put into operation as scheduled in December 1981? What is delaying the orderly completion of construction volumes required at the ELOU [electric desalination unit] AVT [expansion unknown] installation in Neftezavodsk?

Directors of these collectives attribute the failure to meet the state targets to a shortage of personnel, materials and other objective difficulties. It is partly true that somewhat of a labor shortage and disruption of supply have occurred here in spite of measures taken to prevent them. The TZAU builders, for example, received very little pre-cast reinforced concrete in January for use on projects under construction. The Chardzhou Petroleum Refining Plant did not receive enough lumber, pipes and metal. Therefore, the rebuke of "Turkmenstroykomplekt" and "Turkmenstroyindustrii" is quite justified.

However, the immediate organizers of the construction conveyor, the party committees at the sites, ministries and departments also deserve severe reproach. The latest inspection of the state of affairs at the construction projects of the sector presented a sad picture which can be depicted briefly as a state of mismanagement and poor organization of production and work.

We shall present some figures and examples. The first TZAU complex under construction for output of dilute nitric acid and ammonium nitrate should begin production next year but only 10.4 million rubles out of a budget of 34 million has been developed as yet. Rates of operations must be accelerated as much as possible and this requires, first of all, putting into operation their own production base, especially a concrete mixing plant which is badly needed now. However, there are no such bases. The management of the TuSSR Ministry of Construction and the "Marykhimstroy" trust sites have not been able to allocate the forces of the collective properly at the most important sites. The oblast staff for supervision of the construction project, the chairman of which is Deputy Chairman of the oblast Executive Committee F.A. Kazinov, did not notice the obvious error.

The site is literally heaped with materials (at the same time as there is a shortage of them). Sectional reinforced concrete lays without being used because some parts are missing. Expensive metal structures lay on the ground in disorder. In January, 1300 tons of them awaited assembly. The area is so cluttered that it is impossible to dig a foundation pit under the granulation section for which 185 tons, literally, of structural members have been delivered.

There is a simple explanation for this; there is nothing and nobody to erect the structures. The Mary SUMR [expansion unknown] did not provide the mechanisms nor the cranes. Moreover, the small amount of equipment available, frequently is broken and standing idle because Chief of the SUMR N. Seytiyev and the "Spetsstroymekhanizatsiya" trust managers did not get around to taking the initiative to ensure the proper care of the mechanisms and the repair base. Remarks in an address by N. Seytiyev and by manager of the sub-contracting SMU [Construction and Installation Administration] "Turkmenspetsstroy" trust A. Beshimov, who admitted obvious waste in the work, were made at oblast staff meetings many times. What were the conclusions and the results? There are no signs of them, regrettably.

The erectors are working poorly. Last summer, members of "Turkmenkhimmontazh" trust began assembly of the gas containers but stopped because they could not do it. They fulfilled the January quota by 48 percent. Representatives and other organizations of the USSR Ministry of Installation of Special Construction are very scarce at the project. The figure for the "Volgostal'montazh" administration is 21. There are no personnel at the "Yuzhstal'konstruktsii".

It would seem that if the personnel problem is so acute, its solution should be expedited by building more residences and by improving living and working conditions at the project. This, however, is not being done. The Mary house building combine disrupted the introduction of two 56-apartment dwelling houses for the

"Marykhimstroy" trust last year. Housing construction was slow in the first quarter. The dining room is small. Telephone service is not yet available.

Members of the oblast staff certainly should understand that the solution of important social problems provides the key of success in erection of the TZAU. However, significant efforts in the direction required are not being made. Staff meetings involve only the statement of the facts. Is this not the reason why the same points are covered over and over in the minutes of the meetings?

Persons responsible for major difficulties in the installation of the Turkmen Nitrogen Fertilizer Plant were not heard from at all in the last year at Mary Gorkom meetings. Meanwhile, demand from manager subdivisions of the TuSSR Ministry of Construction and the TPRO /Turkmen Production and Control Administration/ of the USSR Minmontazhspetstroy and customer enterprises should be strict and in accordance with Party principle and this refers not only to Mary.

The point is that miscalculations in production organization, illustrated by the example of the situation at TZAU, are typical of other projects of the industry. The solutionsof social problems have been set aside in the latest project in Gaurdak. Suffering from a shortage of workers, the "Gaurdakhimstroy," at the same time, is not building its own dormitory. The Chardzhou house building combine is helping. Last year, instead of the two residential buildings planned, it put only one into use and in January it did not spend a ruble on residential construction.

At the same time, in 1981, the combine greatly exceeded the quota for completion of projects in Chardzhou itself. The principle "my own shirt is nearest to my body" scarcely applies to cases involving a project of national importance. However, neither the TuSSR Ministry of Construction nor the Chardzhou obkom and oblispolkom rebuffed the local biases. They did not take a constructive approach to the solution of the Gaurdak problems. It is high time to create a permanent section for development of a workers' settlement and to reinforce here the position of the ministry and the TPRO. The PVS-350 complex was not finished on time precisely because of the weakness of their collectives.

In a word, there are more than enough reasons for operational interference of Chardzhou obkom workers in the Gaurdak affair. The enterprise faced a real threat of losing the position as a leading collective won by them. If the complex is not delivered in the first half of this year and the miners do not change to the new fourth mining section, serious complications in sulfur output will arise since supplies at the other sections are almost completely exhausted.

The only way out is for all participants in the installation of PVS-350 to work with maximum effort in order to make up, in a short time, what has been allowed to lag and to remember, of course, the schedule which was compiled last August. The TuSSR Minister of Construction N.V. Sheremet'yev and TPRO Chief A.I. Akhmedov, in collaboration with the customer have provided, in this schedule, everything needed for the most rapid completion of work on the complex. However, not one aspect of the time limits proposed has been fulfilled.

Now specialists are complaining that it is impossible to avoid rush work. It would have been possible to avoid the rush work much sooner if the Chardzhou Oblast staff for management of major construction projects in the Five-Year Plan had provided for timely fulfillment of the schedule and had demanded the strict compliance to it by contractors and if staff members had visited Gaurdak more frequently.

Regrettably, not enough attention is being given to another construction project -- the oil-refining plant in Neftezavodsk. There are reports at staff meetings of "poor work" such as that, for example, at the "Turkmenenergostroy" trust and at Minmontazhspetsstroy organizations. They are committed to better work. But then what happens?

This is what happens later. The "Turkmenvostokneftestroy" general contracting trust, wishing to speed up the matter, is assuming the function of a sub-contractor -- the "Montazhkhimzashchit" administration. It is shipping 500,000 rubles worth of metal structures to Ufa. They are then reshipped to Neftezavodsk in the form of heat-resistant panels, in large numbers. The trust is loading the railroad cars by their own efforts by working two shifts. The panels are already crowded on belt lines. G.M. Chochuya chief of "Montazhkhimzashchit" is not responding to appeals to come and begin assembly of the panels. This, thereby ties, hand and foot, another sub-contractor -- the "Neftezavodmontazh" administration and prevents it from carrying out its assignment.

The state of affairs at the installation of the TETs /heat and electric power plant/ may also serve as an example. The project, costing 30 million rubles, should begin operation in 1984, but the "Turkmenenergostroy" trust has assimilated only 220,000 rubles in the last year. What is happening to the unscrupulous managers? How is the project being helped? In essence nothing is happening to the managers nor is help being provided for the project.

Briefly speaking, much has been discussed. However, somewhere they forget that deeds should follow words. It is important to turn attention to the main, decisive item which is, exactly, work with personnel.

Let us return to Krasnovodsk where a large construction project, a slow coking apparatus, is underway. In the second half of last year, oblast and municipal party committees, in collaboration with the TuSSR Ministry of Construction, succeeded in greatly increasing the rates of construction and installation operations at the site or, rather, were able to increase the volume of them. However, the delays, generated by the inactivity of the "Turkmenkhimstroy" trust in recent years have not been overcome. Equipment was not put into operation. Training persons at the site was greatly reduced.

There, the launching was brief and indecisive. Why? It seems, in the first place, basically because extensive methods of management were employed at the site. They assembled, although with delay, many people, much equipment and materials but the resources of the administration and the organization remained unused. At the final stage, the fruits of the inefficiency of the client, the board of directors of the petroleum refining plant, appeared. It became evident that revision of the technological equipment is going poorly and slowly and there are not enough persons for the start-up and adjustment work nor skilled operators.

The construction project faltered. Today only a little more than one-half of the 44 projects of the start-up complex have been accepted.

Improvement of the management method and the style of administration of the capital construction is a problem of paramount importance.

2791
CSO: 1841/179

NEW, EFFICIENT ACETIC ACID PLANT GOES ON LINE, FACES DISTRIBUTION PROBLEMS

Moscow SOTSIALISTICHESKAYA INDUSTRIYA in Russian 31 Mar 82 p 1

[Article by S. Pertsovskiy, contributor to SEVERODONETSKIY KHIMIK, Voroshilovgrad Oblast: "Twice as Cheap, Thrice as Productive"]

/Text/ Chemists of the Northern Donets "Azot" Association imeni Lenin Komsomol have achieved the planned capacity of the largest acetic acid complex in the country three months ahead of time. Then their product was awarded the State Seal of Quality. This is the first such award which the Northern-Donets chemists have won this year.

The collective of the new complex did not spend a great amount of time on this. The outstanding training and high qualification of the workers, engineers and technicians helped in this matter. The occupational proficiency of V. Goncharov, A. Isayev, V. Lysak, L. Uzhik, N. Voronin, B. Reznik and many of their comrades was quite evident here. They attend large tonnage assemblies, units for separation of gases, reforming furnaces in which the technological process begins in the deep cold of 183 degrees below zero and continues up to plus 850 degrees with precision and without the slightest deviations. So now they are producing synthetic acetic acid for the first time in the world.

Most chemists at the new shop are graduates of secondary schools or higher technical schools and almost all have mastered related specialties. Here the results of any change in the regime must be foreseen or otherwise the situation is impossible because of the large number of cycles of different kinds, the corrosive medium and many stages of the process.

"Immediately after start-up" relates shop chief V. Zagorul'kin, "central control panel operators still worked with some allowances in technology, but this is inadmissible now that the loads have increased. Automatic systems and electronics, a new complex controlled with the use of an EVM (electronic computer), stop production if there are any variations in the process."

The new equipment may provide annually 150,000 tons of valuable raw material for chemical, pulp and paper, perfumery, pharmaceutical and some other sectors of industry.

The production level already has exceeded the required standards, and it is noted constantly on shop "quality monitors" that the level of the basic substance in the finished acid reaches 99.8 % or more (while the standard requirement is 99.7 %).

It is no accident that FRG and Finnish firms gladly buy the Northern Donets acetic acid and that it is exported to Czechoslovakia, Hungary and Bulgaria.

One of the basic factors which ensure acceleration of work at the new complex is the assistance of USSR Academy of Sciences scientific Institutes of Chemical Physics and Organic Chemistry and the UkSSR Academy of Sciences Institute of Electric Welding imeni Ye. O. Paton.

"The new complex will pay for itself in only 2.5 years," reports the association director B. Lishina, delegate to the 26th CPSU Congress. "We have used for the first time in the country a large scale method of carbonylation of methanol in which the product is produced not as a result of long conversions of raw material in several shops, but actually under one roof, as a result of the interaction of only two components. It is possible to unload the finished product only 2 or 2.5 hours after feeding the raw material into the reactor. At old facilities the cycle lasts for an entire shift or even 12 hours. Naturally, the production cost of our acetic acid is reduced by 50% and labor productivity is increased three-fold."

It is also quite important that the new equipment ensures practically complete use of wastes and does not harm the environment. The hydrogen which is a waste product in this operation will be used in other shops of the association.

Of course, problems still exist. It seems that some users, especially the Fergana "Azot" Association, the Mogilev "Khimvolokno" Association and the Amzya Wood Chemistry Plant still cannot accomodate such a large amount of raw material, although they sent "rush" orders quite recently. There is a great shortage of special containers. Rolling stock used to ship the product is often kept by the users who turn it into warehouses on wheels, whereas it would be more economical to build permanent containers. Evidently, the Ministry for Production of Mineral Fertilizers should help here.

Actually, the situation is becoming paradoxical. Acetic acid is very necessary to industry while the largest producer quite frequently is operating at only two-thirds of its capacity. We have become accustomed to saying that consumers should be registered with actual suppliers, but here there is now a need to achieve exactly the opposite.

2791
CSO: 1841/179

UDC 658.511.2 : 669.2/8

ECONOMIZING ON NON-FERROUS METALS AND ALLOYS

Moscow KHIMICHESKOYE I NEFTYANOYE MASHINOSTROYENIYE in Russian No 4, Apr 82 pp 5-6

VASIL'YEV, A. M., candidate of technical sciences, member of the collegium, Ministry of Chemical Machinebuilding

[Abstract] To economize on non-ferrous metals such as aluminum, titanium, copper, bronze, lead and brass used in chemical and petroleum machinery, attempts have been concentrated on using substitute materials in laminates and other applications. Hot stamping and powder metallurgy have been used in making screws, spindles and housing. Pipe fittings are being made by pressure casting processes. Products formerly made of nickel alloyed stainless steels are using less nickel (drecreasing from 10% to 2-6%); other alloys are also being utilized that economize on deficit metals. Improved enamel coatings permit use of lower-grade steels in many corrosive environments. Metal cutting devices are being designed that economize on tungsten. Copper laminations for chemical equipment, brass and aluminum use have all been reduced. Major tasks remain in sparing non-ferrous metals in equipment for petroleum and natural gas shipping where these energy sources have high hydrogen sulfide content. Other applications of laminated metals offer additional prospects for economizing.
[182-12131]

UDC 66.023-036.7 : 678.067.5 + 678.7.004.14

UTILIZING PLASTICS AND FIBER GLASS INSTEAD OF STAINLESS STEELS AND NON-FERROUS METALS FOR CHEMICAL EQUIPMENT

Moscow KHIMICHESKOYE I NEFTYANOYE MASHINOSTROYENIYE in Russian No 4, Apr 82 pp 9-11

SEVEROV, G. F., POSYSOYEVA, A. P. and LITVINENKO, A. F., engineers

[Abstract] Plastics, synthetic resins and related materials are being used for chemical containers and various filters for separating suspensions. Filters have been made in drum, strip, plate and carousel forms for vacuum and pressure filtration. Plate and frame filters with hand loading and automatic unloading have been made to replace earlier stainless steel versions. The Northern Donetsk Branch of the Scientific Research Institute for Chemical Machinery has developed press filters of thermoplastics that improve the cleanliness of filtered products, increase corrosion resistance and reduce both the mass of the product and the labor involved in producing it. Polyethylene press filters are being made for aniline-dye and chemical and pharmaceutical applications. Screw-drive plastic loaders to withstand temperatures to 120° C are being produced of polyethylene, polypropylene and other thermoplastics, and chemical containers of 0.8 to 10 cubic meter volume are produced from fiber glass. A fiber glass vacuum drum filter is being made to replace rubber-coated steel versions. All of these applications offer financial benefits and economize on deficit domestic raw materials. Figures 4; references 3 (Russian).
[182-12131]

UDC 621.793.7"313"

PROSPECTS FOR USING GAS-THERMAL SPRAY COATINGS IN PETROLEUM AND CHEMICAL MACHINE BUILDING

Moscow KHIMICHESKOYE I NEFTYANOYE MASHINOSTROYENIYE in Russian No 4, Apr 82 pp 13-14

AFANASENKO, Ye. A., engineer, SHESTAKOV, A. I., candidate of technical sciences, and SLOBODYANIKOV, B. A., engineer

[Abstract] Durable and corrosion-resistant coatings allow reduced metal consumption for spare parts, thus increasing production of machines and equipment. Sprayed coatings are porous and lack durability, and the authors have studied various methods to improve these parameters. Plasma spray and acetylene detonation coating were tested. The sprayed material was applied either as fibers or as a powder, with 40-100 mcm diameter particles. The main drawback of detonation coating was the noise level of production, so plasma spray coating was further studied with special powder made of aluminum

coated with nickel. Self-fluxing Ni-Cr-B-Si powders were also used. Use of deficit nickel is justified in coatings partially because of the durability nickel provides. Various practical applications of plasma spray metal coatings by gas-thermal methods are being used, although delamination of nickel coatings still presents difficulty. Figures 2; references 6 (Russian).
[182-12131]

UDC 677.4.017.56:536.468+678.01:536.468

RATE OF FLAME PROPAGATION IN FABRICS OF DIFFERENT COMPOSITION

Moscow KHIMICHESKIYE VOLOKNA in Russian No 1, Jan-Feb 82
(manuscript received 10 Jun 81) pp 41-42

ZHEVLAKOV, A. F., GROSHEV, Yu. M., YERMAKOVA, I. S., VOLOKHINA, A. V.,
ZHARKOVA, M. A. and SHCHETININ, A. M.

[Abstract] The rates of propagation of flame in fabrics of different composition were investigated with different oxygen content in the gas flow. The rates of flame propagation were determined with the fabric specimen burning from top to bottom. The experiments were carried out in atmospheric air on a device designed to determine the oxygen index. The rates of flame propagation are different for the investigated materials. Materials which burn practically without flame in the form of smoldering showed the lowest rate of flame propagation. The combustion point increased with an increase of oxygen content in the gas flow and as a result the heat flux on the unburned part of the specimen and also the rate of flame propagation increased. Figures 1; references 9: 4 Russian, 5 Western.
[148-6521]

UDC 614.841.415

CRITERION FOR EXTINGUISHING FIRES WITH COOLING FIRE EXTINGUISHERS

Moscow ZHURNAL VSESOYUZNOGO KHIMICHESKOGO OBSHCHESTVA IMENI D. I. MENDELEYEVA
in Russian Vol 27, No 1, Jan-Feb 82 pp 11-17

ABDURAGIMOV, I. M., professor, doctor of technical sciences, head of Chair of Combustion Processes, Higher Engineering Firefighting School, USSR Ministry of Internal Affairs

[Abstract] Soviet and foreign literature is surveyed on problems of developing criteria for extinguishing fires and for optimizing the quantative indicators of efficiency and quality of extinguishing certain types of fires.

The conditions that are necessary and adequate to stop diffusion combustion of gaseous, liquid and solid hydrocarbon fuels from burning are outlined. The quantitative expression of the criterion for extinguishing ordinary fires and the indicators of the effectiveness and quality of extinguishing them are considered in detail. Examples of using the derived criteria are presented for calculating the main parameters of the process of fire extinguishing. Figures 4; references 15: 9 Russian, 6 Western.
[159-6521]

UDC 628.741:622.323

FIREFIGHTING ENGINEERING PROBLEMS OF STORING LIQUIDS IN TANKS

Moscow ZHURNAL VSESOYUZNOGO KHIMICHESKOGO OBSHCHESTVA
IMENI D. I. MENDELEYEVA in Russian Vol 27, No 1, Jan-Feb 82 pp 36-40

VOLKOV, O. M., candidate of technical sciences, docent, deputy chief of Chair of Fire Prevention in Production Processes of Plants, Higher Engineering Firefighting Engineering School, USSR Ministry of Internal Affairs

[Abstract] The current state of firefighting engineering problems of storage of oil, petroleum products and other flammable and fuel liquids in tanks is outlined from materials of Soviet and foreign papers. The results of estimating the flammability of tanks in typical states such as those normally operating, those protected and being repaired, openly burning tanks, those heated by a fire and those with burning in the openings are considered. The characteristic features of the flammability of new large-capacity tanks are noted and the three basic directions of investigations are given. Figures 2; references 21: 17 Russian, 4 Western.
[159-6521]

UDC 614.83:66.074.48

DISCHARGE OF GASES AND VAPORS FROM EQUIPMENT UNDER EMERGENCY CONDITIONS

Moscow ZHURNAL VSESOYUZNOGO KHIMICHESKOGO OBSHCHESTVA
IMENI D. I. MENDELEYEVA in Russian Vol 27, No 1, Jan-Feb 82 pp 61-66

EL'NATANOV, A. I., candidate of chemical sciences, senior scientific worker, State Scientific Research and Planning Institute of the Nitrogen Industry and Products of Organic Synthesis

[Abstract] The methods and procedures for rational discharge of gases and vapors from equipment during emergency situations that arise at chemical and petrochemical enterprises are considered. The main requirements are formulated that are placed on controlled discharge and product gathering systems for open burning. Laboratory and full-scale determination of the effect of

gas and vapor discharge on people and the environment are studied. Practical recommendations are presented on the basis of existing norms and regulations to ensure safety in discharge of these products. References 21: 12 Russian, 9 Western.
[159-6521]

UDC 541(126+127)

NEUTRALIZATION OF WASTES FROM CHLOROORGANIC PLANTS BY BURNING

Moscow ZHURNAL VSESOYUZNOGO KHIMICHESKOGO OBSHCHESTVA
IMENI D. I. MENDELEYEVA in Russian Vol 27, No 1, Jan-Feb 82 pp 67-72

MAL'TSEVA, A. S., candidate of technical sciences, senior scientific worker, GOSNIIKhLORPROYeKT, FROLOV, Yu. Ye., laboratory head, GOSNIIKhLORPROYeKT, and ROZLOVSKIY, A. I., doctor of chemical sciences, senior scientific worker, GOSNIIKhLORPROYeKT

[Abstract] Unutilized chlorine derivatives from the chemical industry are neutralized by burning. It is assumed that all the bound chlorine is converted to hydrochloric acid which is then absorbed by water. Hydrochloric acid is utilized at some plants in the form of the acid or by oxychlorination; neutralization by burning at sea is also widespread with the products being absorbed by sea water. Almost all the bound chlorine can be broken down by neutralization through burning. However, a considerable part of it is converted to the elementary state and to phosgene. The fraction of conversion to chlorine reaches 18 percent for carbon tetrachloride and it reaches from 1.5 to 6 percent in $COCl_2$. It is difficult to completely neutralize these products by water. Neutralization of fuel chlorohydrocarbons is very difficult without additional fuel. This fact makes neutralization of chlorine derivatives by burning ecologically unacceptable. References 53: 16 Russian, 37 Western.
[159-6521]

UDC 661.716.242:658.332.3

PRODUCTION SAFETY AND REFINING OF ACETYLENE

Moscow ZHURNAL VSESOYUZNOGO KHIMICHESKOGO OBSHCHESTVA
IMENI D. I. MENDELEYEVA in Russian Vol 27, No 1, Jan-Feb 82 pp 73-80

STRIZHEVSKIY, I. I., laboratory head, State Scientific Research and Planning Institute of the Nitrogen Industry and Products of Organic Synthesis

[Abstract] The explosive properties of acetylene, means of localizing the breakdown of acetylene and the flame of acetylene-oxygen mixtures and also conditions for safe operation of compressors for compressing acetylene to

$26 \cdot 10^5$ pascals were investigated. Acetylene is the most explosive of all gases used in industry due to its high endothermicity and nonsaturation nature. A device for emergency closing of high-pressure acetylene pipelines is described. The valves are closed by springs arranged radially around the enclosing shaft. Other safety devices include piston servo mechanisms, electric devices, fire barricades for fuel gas signalling devices and tower fire barricades for low- and medium-pressure acetylene pipelines. The safety features of piston compressors for compression of acetylene, the safety of acetylene solutions in liquid ammonia and the safety of acetylene solutions in acetone are given. Figures 6; references 25: 15 Russian, 10 Western.
[159-6521]

UDC 541.127

REGISTRATION OF HO_2 RADICALS IN RAREFIED HYDROGEN-OXYGEN FLAME BY LMR METHOD

Moscow KINETIKA I KATALIZ in Russian Vol 23, No 1, Jan-Feb 82
(manuscript received 18 Aug 81) pp 244-245

AZATYAN, V. V., GAGANIDZE, K. I., KOLESNIKOV, S. A. and TRUBNIKOV, G. R., Institute of Chemical Physics, USSR Academy of Sciences, Moscow

[Abstract] Experimental conditions have been described for direct registration of HO_2 radicals by the laser magnetic resonance method (LMR) in the gaseous phase of a rarefied hydrogen-oxygen flame between the first and second self-ignition limits. The flame was obtained in an electrically heated quartz tube in form of a stream. After emergence from the tube the gas stream passed through the LMR registration cuvette. The flame temperature ranged from 873 to 923 K, with gas pressure of 10-25 mm Hg and the $O_2:H_2$ ratio varying from 4:1 to 1:2. The velocity of the gas stream was 20 m/s. Concentration of HO_2 radicals in the registration cuvette was about 10^{13} cm^{-3}. The spectrum obtained was identical with the spectrum reported in an earlier study. References 9: 7 Russian, 2 Western.
[170-7813]

UDC 665.753.2:542.943:541.127

KINETIC PRINCIPLES OF HYDROPEROXIDE DEGRADATION IN JET FUELS

Moscow NEFTEKHIMIYA in Russian Vol 21, No 6, Nov-Dec 81
(manuscript received 8 Jan 80) pp 909-914

KOVALEV, G. I., ZVEREVA, N. S. and DENISOV, Ye. T.

[Abstract] Hydroperoxides break down in T-6 and RT jet fuels by a first-order reaction and the values of the rate constants of the breakdown is one

to two times greater than the corresponding values for individual peroxides in inert solvents. The activation energy of the breakdown of individual hydroperoxides is 125-170 kJ/mole, which corresponds to the breakdown energy of the molecule and oxygen-oxygen bond. The activation energy is 74-76 kJ/mole in jet fuels. The effectiveness of initiation of hydroperoxides in T-6 jet fuel is 0.04-0.06 and that in RT jet fuel is 0.015-0.020, which is lower than the cellular effect. Figures 3; references 3 (Russian).
[95-6521]

UDC 547.21:665.74:542(941.952)

HYDROISOMERIZATION OF n-PARAFFINS OF KEROSENE WITH HIGH SULFUR CONTENT

Moscow NEFTEKHIMIYA in Russian Vol 21, No 6, Nov-Dec 81
(manuscript received 25 May 81) pp 915-923

KHALIL', F. G., AYYAD, S. and FRANCIS, G., Egyptian Research Institute, Cairo

[Abstract] Using the example of directly distilled high-sulfur kerosene from the Morgan petroleum deposit in Egypt, jet fuel was produced by hydroisomerization of n-paraffins contained in the fraction without preliminary separation. Hydroisomerization of paraffin-naphthene kerosene with high sulfur and nitrogen content can be used to produce jet fuel from it. Kerosene fractions with boiling point of 150-250°C were hydroisomerized on nickel oxide deposited on clay at 350°C and at hydrogen pressure of 5 MPa. The yield of isomers from n-paraffins is 39 percent. Preliminary treatment of the kerosene with concentrated sulfuric acid at the rate of 3 percent by mass yields a more suitable raw material to produce jet fuel using the hydroisomerization process. The results are promising with respect to jet fuel production by direct hydroisomerization of kerosene distillates with minimum cracking. References 21: 8 Russian, 13 Western.
[95-6521]

EXPLOSIVES AND EXPLOSIONS

UDC 614.838:62-5

NEW MEANS OF AUTOMATIC SUPPRESSION OF EXPLOSIONS

Moscow ZHURNAL VSESOYUZNOGO KHIMICHESKOGO OBSHCHESTVA IMENI D. I. MENDELEYEVA in Russian Vol 27, No 1, Jan-Feb 82 pp 3-10

VODYANIK, V. I., head of Laboratory of Explosion Protection of Production Equipment, All-Union Scientific Research Institute of Safety Engineering in the Chemical Industry

[Abstract] Engineering the advantages of automatic systems for suppression of explosions in equipment are shown compared to devices that drop explosive pressure. The dynamics of an explosion developing in a closed space are described and requirements are formulated on this basis for automatic explosion-suppression systems. The design and operating principle of the basic elements of systems such as explosion indicators, explosion suppressors and high-speed flame extinguishers are described. The interaction of a flame-suppressing composition with combustion focal area is considered and the optimum methods of spraying the flame-suppressing composition are described. Examples of using automatic explosion-suppression systems are given and the most promising areas for their use in the chemical industry are shown. Figures 5; references 21: 13 Russian, 8 Western.
[159-6521]

UDC 614.841.34:66

PROBLEMS OF ENSURING EXPLOSION SAFETY OF CHEMICAL PLANTS

Moscow ZHURNAL VSESOYUZNOGO KHIMICHESKOGO OBSHCHESTVA IMENI D. I. MENDELEYEVA in Russian Vol 27, No 1, Jan-Feb 82 pp 22-29

BARATOV, A. N., doctor of technical sciences, deputy chief of All-Union Scientific Research Institute of Firefighting Defense, USSR Ministry of Internal Affairs

[Abstract] The state of problems of categorizing industrial facilities for explosion hazards and also for determining the combustion limits are

analyzed from a critical viewpoint. It is noted that the existing standard method of determining the combustion limits when testing slowing burning materials may provide unreliable results. Free convection sometimes has a significant effect on spreading of flame of new-limit mixtures. The range of combustion of carbon-containing materials is expanded as the pressure increases. The existing principles and criteria for categorizing facilities for explosion hazards have not been adequately perfected. New principles of categorization based on thermodynamic calculation of the explosive load and the difference between the flash point and the temperature of the surrounding medium, are proposed. Figures 7; references 36: 29 Russian, 7 Western.
[159-6521]

UDC 66.013.004.6

QUANTITATIVE ANALYSIS OF HAZARDS AND METHODS OF EXPLOSION PROTECTION OF CHEMICAL PRODUCTION PROCESSES

Moscow ZHURNAL VSESOYUZNOGO KHIMICHESKOGO OBSHCHESTVA IMENI D. I. MENDELEYEVA in Russian Vol 27, No 1, Jan-Feb 82 pp 41-48

BESCHASTNOV, M. V., chief engineer, Administration for Inspection in the Chemical Industry, USSR State Committee of the Council of Ministers for Supervision of Industrial Safety and for Mining Inspection

[Abstract] Quantitative indicators for estimating the flammability of chemical production processes are proposed on the basis of analysis and generalization of the causes of accidents and processing of statistical data. The indicators take into account the energy potentials of the flammability of production processes, the properties and state of flammable and fuel-handling materials, the nature and equipment formulation of processes, specific causes of unsealing of production systems and sources of combustion. A method of estimating the flammability of chemical production processes was proposed which was tested in many real industrial chemical production processes. Efficient engineering solutions of explosion protection are determined from the generalized indicators. References 36: 35 Russian, 1 Western.
[159-6521]

UDC 662.215.2:660

EXPLOSION HAZARD OF PLANTS OF CHEMICAL INDUSTRY RELATED TO HANDLING OF FUEL GASES

Moscow ZHURNAL VSESOYUZNOGO KHIMICHESKOGO OBSHCHESTVA
IMENI D. I. MENDELEYEVA in Russian Vol 27, No 1, Jan-Feb 82 pp 57-60

STREL'CHUK, N. A., professor, doctor of technical sciences, rector of Moscow Construction Engineering Institute imeni V. V. Kuybyshev, PCHELINTSEV, V. A., candidate of technical sciences, senior scientific worker, Moscow Construction Engineering Institute imeni V. V. Kuybyshev, NIKITIN, A. G., candidate of technical sciences, head of Laboratory of Industrial Buildings and Structures, Moscow Construction Engineering Institute imeni V. V. Kuybyshev, and RABINKOV, V. A., junior scientific worker, Moscow Construction Engineering Institute imeni V. V. Kuybyshev

[Abstract] The conditions for formation of explosive-hazardous gas-air mixtures during leaks of fuel gases into production buildings are considered. The same gas may represent a different hazard with respect to the formation and volume of explosion-hazardous mixture with identical intensity of its entry into a building. This factor should be taken into account when evaluating the explosion hazard of plants and when working out solutions for disposition of equipment to ensure explosion safety. References 13: 11 Russian, 2 Western.
[159-6521]

UDC 614.841.41:661.91-498.1

DETERMINATION OF VOLUME OF EXPLOSIVE GAS MIXTURE DURING CATEGORIZATION OF PLANTS

Moscow ZHURNAL VSESOYUZNOGO KHIMICHESKOGO OBSHCHESTVA IMENI D. I. MENDELEYEVA in Russian Vol 27, No 1, Jan-Feb 82 pp 81-84

MAKEYEV, V. I., candidate of technical sciences, chief of laboratory, All-Union Scientific Research Institute of Fire Prevention, MONAKHOV, V. T., candidate of technical sciences, and PLESHAKOV, V. F., chief engineer, "Kriogenmash" Scientific Production Association

[Abstract] A physical mathematical model for the formation of a gas-air cloud during instanteous discharge of gas into an inorganic space was investigated. Data are presented on the parameters of the explosion and fire hazard of volumes of gas-air mixture capable of explosion, the time of existence of an explosion hazard and the dimensions of explosion-hazardous zones on the basis of analytical solution of the problem and experimental results. Numerical values of the coefficient that takes into account the nonuniform filling of an explosive volume with fuel gas were derived for use in calculating the volume of an explosive mixture in categorization of plants. Figures 4; references 7: 5 Russian, 2 Western.
[159-6521]

FERTILIZERS

UDC 661.525:66.092.1

ENVIRONMENTAL SAFETY AND PROTECTION DURING PRODUCTION OF AMMONIUM NITRATE AND FERTILIZERS BASED ON IT

Moscow ZHURNAL VSESOYUZNOGO KHIMICHESKOGO OBSHCHESTVA
IMENI D. I. MENDELEYEVA in Russian Vol 27, No 1, Jan-Feb 82 pp 49-57

STRIZHEVSKIY, I. I., head of Laboratory, State Scientific Research and Planning Institute of the Nitrogen Industry and Products of Organic Synthesis

[Abstract] The thermal breakdown of ammonium nitrate, the process of producing ammonium nitrate in large units, the fire and explosion hazardous properties of fertilizers containing ammonium nitrate and processes of scrubbing gaseous discharges were investigated. Granulated ammonium nitrate used as fertilizer can detonate but requires large explosive charges for initiation at ordinary temperatures. Fertilizers containing ammonium nitrate are classified in four groups. Group A includes ammonium nitrate and mixtures of it capable of detonation transformation, Group B includes mixtures containing ammonium nitrate capable of spontaneous distribution of thermal decomposition, Group C includes mixtures containing ammonium nitrate incapable of spontaneous distribution of thermal breakdown or detonation transformation and Group D includes mixtures which are safe in aqueous solution or in suspension, but are capable of detonation in crystalline form. The temperature of ammonium nitrate in bags or in bulk form should not exceed 55°C in a warehouse. It should be stored in single-story warehouses of second degree of fire resistance. Figures 1; references 33: 16 Russian, 1 Polish, 16 Western.
[159-6521]

ION EXCHANGE PHENOMENA

UDC 541.183

CHANGE OF ION EXCHANGE PROPERTIES OF VPK AMPHOLYTE IRRADIATED IN FORM OF INTRAMOLECULAR SALT

Moscow ZHURNAL FIZICHESKOY KHIMII in Russian Vol 56, No 2, Feb 82
(manuscript received 9 Feb 81) pp 369-371

TABAKOVA, S. V., KISELEVA, Ye. D. and CHMUTOV, K. V. (deceased), Institute of Physical Chemistry, USSR Academy of Sciences, Moscow

[Abstract] The chemical properties of VPK (vinylpyridinecarboxylate) ampholyte undergo drastic changes when placed in different media: in basic solvent they exist as cation exchange resins, in strong acids--as anion exchange resins and in neutral or weakly acidic medium they are found in the form of an intramolecular salt. The most suitable form for the study of VPK radiolysis is that of the intramolecular salt in an acetate buffer. The effect of ionizing radiation on VPK ampholyte was investigated in acetate buffers containing 0.1 M CH_3COOH, 0.1 M CH_3COONa and $NaNO_3$ salts. It was found that irradiation of VPK led to decarboxylation, breaking of the crosslinkage and oxidation of the ion exchange resin. Addition of $NaNO_3$ to the irradiated solution protected the macromolecular structure. The most resistant form of VPK to radiation is that of an intramolecular salt. Figures 2; references 6 (Russian).
[162-7813]

UDC 541.183

CHANGE OF ION EXCHANGE PROPERTIES OF VPK AMPHOLYTE IN COMPLEX FORM DURING IRRADIATION

Moscow ZHURNAL FIZICHESKOY KHIMII in Russian Vol 56, No 2, Feb 82
(manuscript received 9 Feb 81) pp 372-375

TABAKOVA, S. V., KISELEVA, Ye. D. and CHMUTOV, K. V. (deceased), Institute of Physical Chemistry, USSR Academy of Sciences, Moscow

[Abstract] The VPK ampholyte (vinylpyridinecarboxylate) forms strong complexes with many metals. The effect of ionizing radiation was studied

on VPK samples partially filled with Sr^{2+}, Pr^{3+} and UO_2^{2+} ions. The radiation effect was found to be identical in all cases. The metal complexes protected the carboxyl group from breakdown; the complexes remained intact and none of the ions tested were found in solution. Maximum absorption of metal ions on the ampholyte led to total protection from breakdown of the carboxyl groups due to irradiation. However, the crosslinking bonds of the sorbent were broken. Evidently the absorbed energy is principallyllocalized on the weaker COOH bonds and on the sorbent crosslinking bonds. Figures 2; references 9: 8 Russian, 1 Western.
[162-7813]

UDC 547.779.1'81.07

SYNTHESIS AND SOME CONVERSIONS OF 4H-PYRANO[3,2-d]PYRAZOLES

Riga KHIMIYA GETEROTSIKLICHESKIKH SOYEDINENIY in Russian No 3, Mar 82
(manuscript received 6 Jan 81) pp 317-320

MITYURINA, K. V., KHARCHENKO, V. G. and CHERKESOVA, L. V., Saratov State
University imeni N. G. Chernyshevskiy, Saratov

[Abstract] In a new reaction that produced 4H-pyrano[3,2-d]pyrazoles, 4-(3-oxopropyl) pyrazolones were found capable of cyclization into pyranopyrazoles of varying structure with the aid of polyphosphoric acid without solvents when there was an excess of polyphosphoric acid and 60-80° C temperature. Use of alcohol or acetic acid as a solvent retarded the process. The chief features of the pyranopyrazoles' chemical behavior were stability and inertness in salt formation with perchloric acid in acetic anhydride and in Leicart and Chichibabin reactions. An ion hydrogenation reaction not involving the double pyrane bond proceeded successfully to form 5,6-dihydropyrano[3,2-d]pyrazoles. Phosphorus polysulfide in xylol reacted with the pyranopyrazoles to form a salt containing a complex anion made up of dihydrophosphate, dihydrothiophosphate and dihydrodithiophosphate of pyrazolo[5,4-b]thiapyrilium. Reactions with phosphorus polysulfide in various solvents brough formation of various products containing sulfur through an intermediate pyrane stage. Structures were confirmed through proton magnetic resonance. Details of procedures used are presented in the experimental section. References 12: 5 Russian, 7 Western.
[181-12131]

UDC 547.778'789.5'814.5

CHEMISTRY OF ISOFLAVONE HETEROANALOGS, PART 9: INTERACTION OF ISOFLAVONE THIAZOLE ANALOGS WITH NUCLEOPHILIC AND ELECTROPHILIC REAGENTS

Riga KHIMIYA GETEROTSIKLICHESKIKH SOYEDINENIY in Russian No 3, Mar 82
(manuscript received 27 Dec 80) pp 321-327

KHILYA, V. P., KUPCHEVSKAYA, I. P., KAZAKOV, A. L., TKACHUK, T. M. and
GOLUBUSHINA, G. M., Kiev State University imeni T. G. Shevchenko, Kiev

[Abstract] Reactions of thiazole analogs of isoflavones with hydrazinehydrate, methylhydrazine, phenylhydrazine and hydroxylamine readily led to regrouping into derivatives of 2-hydroxyphenyl)pyrazole and pyrazole isomers. Earlier related studies, showing an oxime structure resulting from the reactions of chromones, flavones and isoflavones with hydroxylamine, were shown to be incorrect, with the actual compounds formed being isoxazole isomers. Mixtures of the latter were separated into the individual compounds by selective crystallization and thin-layer chromatography. Details of chromatography aid in identifying individual compounds. Cardiovascular medicinal applications of isoflavone heteroanalogs were studied, and it was learned that several of the title compounds controlled the development of hyperlipidemia, and reduced cholesterol and triglycerides. Details of procedures used are given in the experimental section. References 14: 6 Russian, 1 Hungarian, 1 Polish, 6 Western.
[181-12131]

UDC 547.752.5'793.3.07

SYNTHESIS AND PROPERTIES OF AZOLES AND THEIR DERIVATIVES, PART 33: SYNTHESIZING 1,3,4-OXADIAZOLES CONTAINING INDOLYL RADICAL

Riga KHIMIYA GETEROTSIKLICHESKIKH SOYEDINENIY in Russian No 3, Mar 82
(manuscript received 4 Feb 81; after revision 15 Jul 81) pp 343-347

KELAREV, V. I. and SHVEKHGEYMER, G. A., Moscow Institute of Petrochemical
and Gas Production imeni I. M. Gubkin, Moscow

[Abstract] Continuing study of the synthesis and conversions of iminoether hydrochlorides, the authors studied the latter's reactions with certain hydrazides to obtain corresponding 1,3,4-oxadiazoles that are little known. Condensation of iminoether ethyl hydrochlorides of 3-indolcarboxylic and 3-indolylacetic acids with hydrazides produced corresponding 2,5-disubstituted 1,3,4-oxadiazoles containing indole residues. A similar reaction using hydrazides of the two acids produced lesser yields. A former method using carboxylic acids and hydrazine salts in the presence of polyphosphoric acid was shown to be capable of synthesizing symmetrical indolyloxadiazoles from the corresponding indole acids. Structural results were confirmed by

proton magnetic resonance. Details of the procedures are given in the experimental section. References 7: 3 Russian, 4 Western.
[181-12131]

UDC 547.785.5.07

SYNTHESIS AND DERIVATIVES OF IMIDAZO[1,2-a]IMIDAZOLE

Riga KHIMIYA GETEROTSIKLICHESKIKH SOYEDINENIY in Russian No 3, Mar 82 (manuscript received 14 May 81) pp 384-387

IVASHCHENKO, A. V., LAZAREVA, V. T., SHMELEV, L. V. and POPONOVA, R. V., Scientific Research Institute for Organic Intermediate Products and Dyes, Moscow

[Abstract] Continuing the synthesis and study of derivatives of 1(7)H-imidazo 1,2-a imidazole reported earlier, the authors produced 1(7)H-imidazo[1,2-a]imidazoles through reduction of 1-benzylidineaminoimidazo-[1,2-a]imidazoles with zinc in acetic acid. The title compounds partially form corresponding N-oxides when separated from the reactive mass. The composition and structure of the synthesized compounds were confirmed by element analysis and electron, infra-red, X-ray electron, proton magnetic resonance and mass spectrography. The PMR spectra of the compounds in the reaction show aliphatic, aromatic and NH protons, while, after separation, ortho-proton signals of a phenyl ring were observed. The effect of nitrous acid on 1-amino-3,6-diphenyl-2,5-dipropylimidazo[1,2-a]imidazole brought formation of an N-oxide and not of 1H-imidazo[1,2-a]imidazole, as previously reported (KHIMIYA GETEROTSIKLICHESKIKH SOYEDINENIY No 9, Sep 73 p 1190). Details of the procedures used are given in the experimental section. References 4 (Russian).
[181-12131]

UDC 547.821'853 : 541.6

CHEMICAL PROPERTIES OF AZINEYLIDENE DERIVATIVES, PART 1: STRUCTURE OF PROTONIZATION PRODUCTS OF DIHYDROPYRIMIDYLIDENE-2- AND -4-CYANACETIC ESTERS

Riga KHIMIYA GETEROTSIKLICHESKIKH SOYEDINENIY in Russian No 3, Mar 82 (manuscript received 29 Jun 81) pp 397-404

ZAGULYAYEVA, O. A., GRIGORKINA, O. A., MAMATYUK, V. I. and MAMAYEV, V. P., Novosibirsk Institute of Organic Chemistry, Siberian Branch, USSR Academy of Sciences

[Abstract] Initial esters were synthesized by a heteroarylation reaction of Na-cyanoacetic esters with corresponding chloropyrimidines. Because of

the instability of 4-chloropyrimidine, an unsubstituted 3,4-dihydropyrimidylidene-4-cyanoacetic ester was obtained by catalytic dechlorination of 6-chloro-3,4-dihydropyrimidylidene-4-cyanoacetic ester. The structures of the products obtained are confirmed by infrared, ultraviolet and proton magnetic resonance spectra. The data thus obtained did not rule out partial protonization with the formation of aromatic structures, which were rapidly converting with the unprotonized form. An example of the latter occurs with 1,2-dihydropyridylidene-2-cyanoacetic ester in a CF_3COOH solution. More precise structural confirmation was obtained by using nuclear magnetic resonance of ^{13}C. Data indicated that dihydropyrimidylidene cyanoacetic esters that were analogous to enaminoketones were polar compounds with pronounced charge alternations in the neutral molecule and the cation. NMR data enabled calculation of the degree of protonization in mediums of varying acidity, and led to the overall conclusion that in contrast to corresponding alpha-derivatives of pyridine, in strong acid solutions and as perchlorates, the title esters have ilidene structures. Details of the procedures used are given in the experimental section. References 15: 6 Russian, 9 Western.
[181-12131]

UDC: 542.91:547.796.1

SYNTHESIS OF TETRAZOLES FROM CYANOESTERS AND ORGANIC AZIDES UNDER HIGH PRESSURE CONDITIONS

Moscow IZVESTIYA AKADEMII NAUK SSSR: SERIYA KHIMICHESKAYA in Russian No 3, Mar 82 (manuscript received 16 Jun 81) pp 640-645

KRAYUSHKIN, M. M., BESKOPYL'NYY, A. M., ZLOTIN, S. G., SON, V. V., VAYNBERG, N. N., LUK'YANOV, O. A. and ZHULIN, V. M., Institute of Organic Chemistry imeni N. D. Zelinskiy, USSR Academy of Sciences, Moscow

[Abstract] It was earlier shown that phenylcyanate, which does not react with organic azides at atmospheric pressure, does react with benzylazide under high pressure conditions, forming N-benzyl-5-phenoxytetrazole with good yield. The purpose of this work is to determine the area of application of the reaction, its regiodirectivity and to establish the variation of its speed with pressure. The initial nitriles used were cyanoesters of phenol and its 4-methyl-,4-methoxy-,4-bromo-,4-chloro-, and 4-nitro derivatives, as well as the cyanoester of β, β, β-trichloroethanol. Benzylazide, phenylazide and cyclohexylazide were used as the azide components. The main products of the reaction at 10 kbar and 105°C are derivatives of 1-benzyl-5-phenoxy-tetrazole. Yield 74-97%. The regioselectivity observed is a result of the orienting effect of orbital and electrostatic interactions. References 14: 5 Russian, 9 Western.
[184-6508]

UDC: 542.91:547.793.2

SYNTHESIS OF ISOMERIC 3(4)-NITRO-4(3)-PHENYLFUROXANES

Moscow IZVESTIYA AKADEMII NAUK SSSR: SERIYA KHIMICHESKAYA in Russian No 3, Mar 82 (manuscript received 1 Sep 81) pp 646-649

MAKHOVA, N. N., OVCHINNIKOV, I. V., KHASAPOV, B. N. and KHMEL'NITSKIY, L. I., Institute of Organic Chemistry imeni N. D. Zelinskiy, USSR Academy of Sciences, Moscow

[Abstract] This work was undertaken to determine the possibility of existence of 3-nitro-4-phenylfuroxane. The latter was produced by oxidation of 3-amino-4-phenylfuroxane with trifluoroperacetic acid in methylene chloride. The product synthesized is the first 3-nitro derivative of furoxane produced in the laboratory. The presence of the N-oxide atom of O next to the amino group is found to have a significant influence on the reactivity of amino furoxanes in oxidation. References 7: 1 Russian, 6 Western.
[184-6508]

ORGANOMETALLIC COMPOUNDS

UDC 546.05.98.18.18.33.34

SYNTHESIS OF DOUBLE LITHIUM, SODIUM AND PALLADIUM PYROPHOSPHATES

Moscow ZHURNAL NEORGANICHESKOY KHIMII in Russian Vol 27, No 2, Feb 82
(manuscript received 17 May 81) pp 302-304

SOKOLOVA, I. D., MARKINA, I. B. and SHAPLYGIN, I. S., Institute of General and Inorganic Chemistry imeni N. S. Kurnakov, USSR Academy of Sciences

[Abstract] Double lithium, sodium and palladium pyrophosphates—$Li_2PdP_2O_7$ and $Na_2PdP_2O_7$—were produced by the solid-phase reaction method and their properties were studied. The quantitative rate of reaction was judged by the loss of mass of the initial mixture and the constant mass of the final product during heat treatment. The loss of mass by the reaction mixture due to removal of gaseous products was close to the calculated loss of mass for the initial reaction. Infrared spectra of the products confirmed the presence of pyrophosphate groups in them. Comparison of the X-ray diffraction patterns obtained for lithium and sodium pyrophosphates to the X-ray diffraction patterns of powders of previously synthesized $K_2NiP_2O_7$, $K_2CdP_2O_7$ and $K_2CaP_2O_7$ does not indicate any similarity in the structures of these compounds. Figures 2; references 8: 2 Russian, 6 Western.
[132-6521]

UDC 541.9+541.6

COORDINATION COMPOUNDS OF METALS AND CYANOACETYLHYDRAZINE

Moscow ZHURNAL NEORGANICHESKOY KHIMII in Russian Vol 27, No 2, Feb 82
(manuscript received 25 Mar 81) pp 402-406

MACHKHOSHVILI, R. I., MITAISHVILI, G. Sh. and PIRTSKHALAVA, N. I., Institute of General and Inorganic Chemistry imeni N. S. Kurnakov, USSR Academy of Sciences

[Abstract] The complex compounds $M(NCAH)_3X_2$, $M(NCAH)_2(NCS)_2$, $M(NCAH-H)_n$ (M = Cu, Zn, Cd, Co and Ni, NCAN = $NCCH_2CONHNH_2$, X = Cl, $1/2SO_4$ and n = 2 or 3) were produced upon reaction of copper, zinc, cadmium, cobalt and nickel chlorides, sulfates and thiocyanates and also

$[Co(NH_3)_5Cl]Cl_2$ with cyanoacetylhydrazine. The properties and infrared absorption spectra of the synthesized compounds were studied and the complex $Co(NCAH)_2(NCS)_2$ was investigated by the X-ray diffraction method. The infrared absorption spectra of the synthesized compounds and some of their deuterium analogs were studied (with respect to the NH or ND bonds) to determine the methods of coordination of cyanoacetylhydrazine molecules in different tautomeric forms and also to study the structure of cyanoacetylhydrazine complexes of metals. Figures 2; references 7 (Russian).
[132-6521]

UDC 547.258.11

REACTION OF ORGANOTIN ACETYLENES WITH ORGANIC HALIDES OF TIN

Leningrad ZHURNAL OBSHCHEY KHIMII in Russian Vol 52, No 2, Feb 82
(manuscript received 26 Aug 81) pp 452-453

KOMAROV, N. V., ANDREYEV, A. A. and SENICHEV, V. S.

[Abstract] A study was made of the reaction of organotin acetylenes with dihalides of dialkyl tin as a possible way of synthesizing substances with the general formula $XR_2SnC{\equiv}CR' + R''_2SnX_2 \rightarrow XR''_2SnC{\equiv}CR' + R_3SnX$, where R' = H, C_4H_9, C_6H_5, $Sn(C_2H_5)_3$ and R" = CH_3, C_2H_5 and X = Cl, Br. With bis(triethyl tin) acetylene the reaction takes place with the participation of both $(C_2H_5)_3Sn$ groups and results in the formation of bis(halogen diethyl tin) acetylenes. The polymer $[(CH_3)_2SnC{\equiv}C]_n$ is produced when bis(triethyl tin) acetylene reacts with dimethyldichloro tin. Dialkylchloro tin acetylenes are highly reactive compounds and split easily at the $Sn{-}C_{sp}$ bond under the influence of water. Bis(diethylchloro tin) acetylene was obtained by heating in a sealed ampoule at 139 °C for 1.5 h a mixture of 15.3 g of diethyldichloro tin and 13.4 g of bis(triethyl tin) acetylene. After cooling, the precipitated crystals were filtered off and recrystallized from hexane. The yield of the product was 73 percent and it had a melting point of 92 °C. Bis(diethylbromo tin) acetylene was produced similarly from 13.4 g of diethyldibromo tin and 8.7 g of bis(triethyl tin) acetylene. Polydimethylstannyl acetylene was produced from 4.40 g of dimethyldichloro tin and 4.36 g of bis(triethylstannyl) acetylene in a sealed ampoule at 100 °C for 4 h. The resulting polymer was in the form of a white amorphous powder which decomposes without melting when heated above 180 °C. References 2 (Russian).
[173-8831]

UDC: 541.11:541.49:546.725:547.85

THERMAL STABILITY CF DI-IRON-HEXACARBONYL COMPLEXES OBTAINED FROM AROMATIC AZINES

Moscow IZVESTIYA AKADEMII NAUK SSSR: SERIYA KHIMICHESKAYA in Russian
No 3, Mar 82 (manuscript received 12 Jun 81) pp 692-695

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[Abstract] A study was made of the thermal stability of di-iron-hexacarbonyl complexes obtained from aromatic azines. Study of the thermal decomposition of the compounds showed that their derivatograms are similar in nature. In all cases the DTA curves show a slight endothermic effect at the melting temperature of the complex, not accompanied by a decrease in weight. The derivatograms show that the iron carbonyl complexes decompose in three stages. The first is very rapid, featuring separation of three carbonyl groups. It is immediately followed by loss of three more CO groups. Above 210°C the products of decomposition of the ligands are liberated. Completion of the separation of these products occurs above 270°C. The temperature at which the decomposition of the complexes containing two 3-electron nitrogen-containing bridges begins is independent of ligand structure. References 9: 4 Russian, 5 Western.
[184-6508]

UDC: 543.241.5:543.42.062:546.185'78-325

ACIDITY FUNCTION OF CONCENTRATED 12-TUNGSTOPHOSPHORIC ACID SOLUTIONS

Moscow IZVESTIYA AKADEMII NAUK SSSR: SERIYA KHIMICHESKAYA in Russian No 3,
Mar 82 (manuscript received 19 May 81) pp 492-493

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[Abstract] In order to estimate the catalytic effect of heteropolyacids in acid type reactions and to compare the strength of heteropolyacids with other mineral acids in concentrated solutions, the acidity function of one of the strongest heteropolyacids is measured in water, 40 vol.% aqueous dioxane and 94.5 vol.% HOAc with acid concentration not over 50% at 20°C. In all cases the acidity of the concentrated acid solutions is higher than for H_2SO_4 and $HClO_4$ by 1-1.5 H_o units. References 9: 4 Russian, 5 Western.
[184-6508]

UDC: 541.6:541.49:547.567.2:546.811

SOME PROBLEMS OF STRUCTURE OF TIN-CONTAINING 3,6-DI-TERT-BUTYLORTHOBENZOQUINONE COMPLEXES AND METALLOTROPIC CONVERSIONS IN THESE SYSTEMS

Moscow IZVESTIYA AKADEMII NAUK SSSR: SERIYA KHIMICHESKAYA in Russian No 3, Mar 82 (manuscript received 19 Jun 81) pp 540-549

PROKOF'YEV, A. I., POMBRIK, S. I., KASYMBEKOVA, Z. K., BUBNOV, N. N., SOLODOVNIKOV, S. P., KRAVTSOV, D. N. and KABACHNIK, M. I., Institute of Heteroorganic Compounds imeni A. N. Nesmeyanov, USSR Academy of Sciences, Moscow

[Abstract] A number of aromatic radicals with groups of various degrees of electronegativity were studied by EPR methods to clarify the details of radical metallotropy. Metallotropy was found to result from two oppositely acting factors: the coordinating capacity of the central atom of the migrating fragment and the metal-oxygen bond strength. The EPR spectral parameters and spin density distribution in the free radical ligand of the tin-containing complexes studied depend on the nature of the substituent at the tin atom. The migration frequency in these radicals is determined by the strength of the SnO bond and the coordination saturation of the Sn atom as well as the spin density at the monovalent O atom. The polarity of the medium determines the direction of the ligand substitution reaction as orthoquinone interacts with monochlorine organic compounds of tin. In nonpolar media the organic ligand is substituted, in polar media such as DMSO the Cl atom is substituted. Figures 4; references 21: 12 Russian, 9 Western.
[184-6508]

UDC: 541.124:541.49:547.567.2:661.668

LIGAND SUBSTITUTION REACTION IN PARAMAGNETIC o-QUINONETETRACARBONYLMANGANESE AND TETRACARBONYLRHENIUM COMPLEXES

Moscow IZEVESTIYA AKADEMII NAUK SSSR: SERIYA KHIMICHESKAYA in Russian No 3, Mar 82 (manuscript received 9 Jul 81) pp 550-555

SARBASOV, K. , TUMANSKIY, B. L., SOLODOVNIKOV, S. P., BUBNOV, N. N., PROKOF'YEV, A. I. and KABACHNIK, M. I., Institute of Heteroorganic Compounds imeni A. N. Nesmeyanov, USSR Academy of Sciences, Moscow

[Abstract] In order to determine the influence of the paramagnetic ligand on the mobility of CO groups, a study was made of the kinetics of ligand substitution in 3,6-di-tert-butyl-o-quinone(3,6-Q). To do this, a toluene solution of phosphite or amine of known concentration was added to a solution of 3,6-Q in toluene at about -70°C. The mobility of CO groups in orthoquinone complexes with tetracarbonylmanganese is significantly higher than in $Mn_2(CO)_{10}$. Figures 2; references 4: 2 Russian, 2 Western.
[184-6508]

UDC: 541.13:541.49:546.73:547.574.3

ELECTROCHEMICAL STUDY OF OXYGEN ADDUCTS OF COBALT COMPLEXES WITH BENZALDEHYDE AROYLHYDRAZONES IN DIMETHYLFORMAMIDE

Moscow IZVESTIYA AKADEMII NAUK SSSR: SERIYA KHIMICHESKAYA in Russian No 3, Mar 82 (manuscript received 5 Jun 81) pp 555-560

MUNIN, Ye. N., TROYEPOL'SKAYA, T. V. and KITAYEV, Yu. P., Institute of Organic and Physical Chemistry imeni A. Ye. Arbuzov, Kazan' Affiliate, USSR Academy of Sciences

[Abstract] There is very little information available on oxygen-containing adducts of hydrazone complexes. The authors therefore studied the electrochemical behavior of CO complexes with benzoyl- and salicyloyl hydrazones of benzaldehyde in DMFA, finding certain anomalies in chemical behavior. The kinetic nature of the chelate reduction current in the second wave in constant-current polarography is explained by the splitting of attached oxygen in the process of electrolysis after transfer of the first electron. Cyclical volt-ampere measurement was used to record the formation of intermediate complex particles with the metal at 0 oxidation. Figures 4; references 8: 4 Russian, 4 Western.
[184-6508]

UDC: 42.91:541.49:547.1'118

α-HYDROXY-γ-[N,N-BIS(DIOXYPHOSPHORYLMETHYL)AMINO]PROPYLIDENEDIPHOSPHONIC ACID AS COMPLEXON

Moscow IZVESTIYA AKADEMII NAUK SSSR: SERIYA KHIMICHESKAYA in Russian No 3, Mar 82 (manuscript received 11 Aug 81) pp 560-564

SHCHERBAKOV, B. K., BEL'SKIY, F. I., KOMAROVA, M. P., POLIKARPOV, Yu. M., MEDVED', T. Ya. and KABACHNIK, M. I., Institute of Heteroorganic Compounds imeni A. N. Nesmeyanov, USSR Academy of Sciences, Moscow

[Abstract] In order to study the complex-forming properties of the compound in the title, the authors studied its synthesis from the corresponding amino-substituted hydroxypropylidenediphosphonic acid by phosphonomethylation. The NMR spectrum of an aqueous solution of the compound contains two signals displaced relative to 85% H_3PO_4 by 8.4 and 17.3 md into the strong field area, indicating the presence of two nonequivalent P nuclei. The IR spectra of solutions in H_2O and D_2O were studied with pH (pD) corresponding to primary content of ionic forms of L^{8-}, HL^{7-} and H_2L^{6-}. The stability of complexes of the acid is increased by the presence of fragments of hydroxyalkylydenediphosphonic and iminodi(methylphosphonic) acids simultaneously in the molecule. Figure 1; references 18: 8 Russian, 10 Western.
[184-6508]

UDC 541.63:547.1'118

STERICAL STRUCTURE OF 5-PHENYL-5-SELENO-1,3,5-DIOXA- AND 5-PHENYL-5-SELENO-1,3,5-DIAZAPHOSPHORINANES

Moscow IZVESTIYA AKADEMII NAUK SSSR: SERIYA KHIMICHESKAYA in Russian No 1, Jan 82 (manuscript received 4 May 81) pp 127-131

ARBUZOV, B. A., YERASTOV, O. A., ZYABLIKOVA, T. A., IGNAT'YEVA, S. N., NIKONOV, G. N., ARSHINOVA, R. P. and KADYROV, R. A., Institute of Organic and Physical Chemistry imeni A. Ye. Arbuzov, Kazan' Branch, USSR Academy of Sciences

[Abstract] The three-dimensional structure of 5-phenyl-5-seleno-1,3,5-dioxa- and diazaphosphorinanes was determined. Substituted 5-phenyl-5-seleno-1,3,5-dioxaphosphorinanes were found to exist in the form of stereo isomers distinguished by orientation of substitution at the phosphorous and carbon atoms. The stereo isomer is thermodynamically stable in the case of 5-phenyl-seleno-2,4,6-trimethyl-1,3,5-dioxaphosphorinane in a chair conformation with an axial phenyl at the phosphorus atom. The diazaphosphorinanes are a mixture of conformers distinguished by phenyl orientation at the phosphorus atom. Figures 1; references 14: 11 Russian, 3 Western. [128-6521]

UDC 542.951.1:541.49:547.1'118

ACYLATION OF β-KETOILIDES OF PHOSPHORUS BY ACID CHLORANHYDRIDES

Moscow IZVESTIYA AKADEMII NAUK SSSR: SERIYA KHIMICHESKAYA in Russian No 1, Jan 82 (manuscript received 4 Jun 81) pp 192-194

NESMEYANOV, N. A., BERMAN, S. T., REBROVA, O. A. and REUTOV, O. A., Moscow State University imeni M. V. Lomonosov

[Abstract] Only acyloxyvinylphosphonic salts are formed when β-oxoalkylidenetriphenylphosphoranes react with chloranhydrides of p-nitrobenzoic, cinnamic and phenylacetic acids. All presently known reactions of

β-ketoilides of phosphorus with chloroanhydrides of acids lead to O-acylation products. References 7: 4 Russian, 3 Western.
[128-6521]

UDC 547.341+541.67

APICOPHILICITY OF EXTRACYCLIC GROUP, STRUCTURE AND STABILITY OF SPIROPHOSPHORANES

Leningrad ZHURNAL OBSHCHEY KHIMII in Russian Vol 52, No 2, Feb 82
(manuscript received 1 Apr 81) pp 239-250

RAGULIN, V. V., PETROV, A. A., ZAKHAROV, V. I. and RAZUMOVA, N. A. (deceased), Leningrad Technological Institute imeni Lensovet [Leningrad Soviet of Workers' Deputies]

[Abstract] Apicophilicity of the extracyclic group is one factor determining the ability of spirobicyclic phosphoranes to enter the permutation isomerization process, i.e., permutation isomerization of ligands around the central phosphorus atom. An evaluation is made of the influence of apicophilicity of the extracyclic group on the structure and stability of spirophosphoranes. Spiro-1,2-oxaphosphol-4-enes, formed as the result of 1,4-cyclic-addition of acrolein and crotonic and cinnamic aldehyde to dioxaphospholanes with a 3-coordinated phosphorus atom, served as the subjects of study. These subjects were selected because of their different extracyclic substituents, making it possible to anticipate varying permutation stability among spirophosphoranes. Dioxaphospholane-1,2-oxaphosphol-4-enes were produced in the form of colorless oily liquids or white crystals. Their structure was proven by IR and NMR ^1H, ^{13}C and ^{31}P spectra analysis. It is demonstrated that crotonic and cinnamic aldehyde and dioxaphospholanes of 3-coordinated phosphorus form a mixture of diastereomeric spirobicyclic phosphoranes and the thermodynamically preferred reaction product is a diastereomer with anti-orientation of substituents at the phosphorus and alpha-carbon of the oxaphospholene ring. NMR ^1H and ^{31}P spectra demonstrate considerable participation of phenyl- and dialkylamido extracyclic substituents in p_π-d_π interaction with vacant 3d-orbitals of 5-coordinated phosphorus. Permutational and thermal metastability result when extracyclic alkoxy groups are added to a molecule of dioxaphospholane-1,2-oxaphosphole-4-ene. It is suggested that the spin-spin interaction constant for phosphorus with the alpha-carbon atom can be used as a test indication of a stereoisomeric structure. Figures 3; references 13: 6 Russian, 7 Western.
[173-8831]

UDC 547.341

1,3-ALKADIENEPHOSPHONATES. STEREOCHEMICAL STUDY OF BROMINATION AND DEHYDROBROMINATION OF DERIVATIVES OF 1,3-ALKADIENE-1-PHOSPHONIC ACIDS

Leningrad ZHURNAL OBSHCHEY KHIMII in Russian Vol 52, No 2, Feb 82
(manuscript received 7 Apr 81) pp 250-263

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of Workers' Deputies]

[Abstract] Stereochemical factors exert considerable influence on the direction of reactions for halogenation of derivatives of unsaturated phosphonic acids. As a continuation of a study of stereochemical aspects of the reactivity of unsaturated organophosphorus compounds, a study is presented of bromination and subsequent dehydrobromination of dichloranhydrides and ethers of 1,3-butadiene-, 1,3-pentadiene-, 2-methyl-1,3-butadiene- and 2,3-dimethyl-1,3-butadienephosphonic acids. It has been established that the original 1,3-dienephosphonates are characterized principally by s-trans-conformation in relation to the $=C^2-C^3=$ bond. Alkadienephosphonates are brominated in CCl_4 at room temperature and prolonged holding or heating is required to complete the reaction. All products were separated in the individual state by means of vacuum distillation. An analysis of the PMR spectra of bromination products demonstrated that in all cases simple addition of the bromine takes place at a $C^3=C^4$ multiple bond remote from the phosphorus. Bromination of dichloranhydrides and ethers of 1,3-alkadiene-1-phosphonic acids results in formation of 3,4-dibromo-1-alkene-1-phosphonates. Dehydrobromination with the presence of hydrogen at the No 3 position results in formation of 3-bromo-1,3-alkadiene-1-phosphonates. It has been proven that the 3-bromo-1,3-alkadiene-1-phosphonates formed exhibit principally s-trans-conformation in relation to the $=C^2-C^3=$ bond. Dehydrobromination is inhibited in Z-isomers by polar interaction of the hydrogen in the No 3 position and the phosphonic group. This indicates a dehydrobromination mechanism whereby the hydrogen atom in the No 3 position is attacked by the base. Figures 4; references 13: 12 Russian, 1 Western.
[173-8831]

UDC 547.341

CHLORINATION OF TERTIARY ALLENIC OXIDES OF PHOSPHINE

Leningrad ZHURNAL OBSHCHEY KHIMII in Russian Vol 52, No 2, Feb 82
(manuscript received 12 Mar 81) pp 264-268

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[Abstract] Chlorination of the oxide of dimethyl(3-methyl-1,2-butadienyl)-phosphine in carbon tetrachloride results in formation of the chloride of

4-chloro-2,2,5,5-tetramethyl-1,2-oxaphosphol-3-ene (I). However, chlorination of the oxide of diphenyl(3-methyl-1,2-butadienyl)phosphine in carbon tetrachloride does not result in formation of a cyclic product and the chlorine is added at the $C^2=C^3$ double bond. The physical properties of this substance differ considerably from those of I. Chlorination of oxides of diphenyl(1,2-butadienyl)- and diphenylallenylphosphine also results in products of addition at the $C^2=C^3$ double bond. These differences in chlorination of tertiary allenic oxides of phosphine prove the considerable spatial influence of subsitutents at the phosphorus on the geometry of the transient state. It is suggested that the bulky phenyl radicals prevent overlapping of p-orbitals of the phosphoryl oxygen with the p-orbital of the carbonium ion formed at the intermediate stage, promoting addition of the chloride anion at the C^3 atom. It has been demonstrated that cyclic phosphonium compounds or products of addition at the $C^2=C^3$ double bond are produced depending on the substituents at the phosphorus. Replacing a single phenyl radical in the oxide of diphenyl(3-methyl-1,2-butadienyl)phosphine with chlorine results in formation of a cyclic oxaphospholene. Figures 3; references 10: 9 Russian, 1 Western.
[173-8831]

UDC 547.341

INTERACTION OF DIETHYL ETHER OF 2-ETHOXYETHENYLPHOSPHONOUS ACID WITH SUBSTITUTED NITRYLIMINES

Leningrad ZHURNAL OBSHCHEY KHIMII in Russian Vol 52, No 2, Feb 82
(manuscript received 13 Apr 81) pp 268-272

PLATONOV, A. Yu., TROSTYANSKAYA, I. G., KAZANKOVA, M. A. and CHISTOKLETOV, V. N., Leningrad Technological Institute of the Pulp and Paper Industry; Moscow State University imeni M. V. Lomonosov

[Abstract] It has been demonstrated that diethyl-2-ethoxyethenylphosphonite reacts with substituted nitrylimines in the presence of triethylamine according to a 3 + 3 = 6 arrangement with elimination of the ethoxy group at the No 2 position of the multiple bond and the end products of these reactions are derivatives of 4-ethoxy-4-oxo-1,4-dihydro-1,2,4-diazaphosphorine. These derivatives have formulas of $C_{17}H_{16}N_3O_4P$, $C_{19}H_{19}N_2O_3P$ and $C_{14}H_{16}N_3O_6P$. The reaction represents a 1,3-dipolar 3 + 3 = 6 cyclic addition reaction. An analysis was made of possible ways of forming these derivatives from the results of a gas-liquid chromatographic determination in the reaction mass of volatile components such as ethyl chloride, ethyl alcohol and diethyl ether. Data are presented on the change in concentration of ethyl chloride and ethanol in the reaction of diethyl-2-ethoxyethenylphosphonite with C-p-nitrophenyl-N-phenylnitrylimine. The analysis made it possible to conclude that the stabilization of intermediate cyclic ylides takes place by means of the protonation of the anion center by triethylamine hydrochloride with the subsequent detachment of the ethanol and formation of derivatives of 4-oxo-1,4-dihydro-1,2,4-diazaphosphorine. The structure and composition of the products was confirmed by elemental analysis and IR, PMR and NMR ^{31}P spectroscopic data. Values of chemical shifts in NMR ^{31}P

spectra testify to quaternization of the phosphorus atom during cyclic addition. A mixture consisting of 0.0025 mole N^1-α-chloro-p-nitrobenzylidene-N^2-phenylhydrazine, 0.0075 mole triethylamine and 0.0025 mole diethyl-2-ethoxyethenylphosphonite in 30 ml absolute benzene was stirred while gradually being heated to 70 °C for 6 h in an atmosphere of argon to the point of cessation of the accumulation of ethyl chloride and ethanol among the reaction products, as checked by gas chromatography data. After the reaction mass was cooled, small quantities of triethylamine hydrochloride were filtered off, the solvent was eliminated by distillation and the residue was crystallized by trituration with ether. Six tenths of a gram (67 percent) of 1-phenyl-3-p-nitrophenyl-4-ethoxy-4-oxo-1,4-dihydro-1,2,4-diazaphosphorine were produced. References 6 (Russian).
[173-8831]

UDC 541.57 : 546.17 + 546.18

PRESERVATION OF P-N BOND IN REACTION OF GAMMA-KETOALKYLAMIDOPHOSPHITES WITH PROTON DONOR REACTANTS

Leningrad ZHURNAL OBSHCHEY KHIMII in Russian Vol 52, No 2, Feb 82
(manuscript received 28 Oct 80) pp 272-277

MUKHAMETOV, F. S., STEPASHKINA, L. V. (deceased), RIZPOLOZHENSKIY, N. I. and SHAGIDULLIN, R. R., Institute of Organic and Physical Chemistry imeni A. Ye. Arbuzov, Kazan' Branch, USSR Academy of Sciences

[Abstract] The results are given of a study of reactions of hydrogen sulfide and thiophenol with methyldiethylamido(α,α -dimethyl-γ-ketobutyl)-phosphite (Ia), propyldiethylamido(α,α -dimethyl-γ-ketobutyl)phosphite (Ib), heptyldiethylamido(α,α -dimethyl-γ-ketobutyl)phosphite (Ic), tetramethyldiamido(α,α -dimethyl-γ-ketobutyl)phosphite (Id) and tetraethyldiamido-(α,α -dimethyl-γ-ketobutyl)phosphite (Ie). It was shown that when hydrogen sulfide reacts with amidophosphites Ia to Ic and when thiophenol reacts with amidophosphite Ia the same crystalline substance is produced, which has been identified as trans-2-diethylamino-2-oxo-3,5,5-trimethyl-1,2-oxaphospholan-3-ol. A phosphoryl group was contained in the structure of the end product, and not a thiophosphoryl, and thianisole was identified in the liquid part of the reaction mixture in the case of thiophenol. These data prove that the reaction takes place through an intermediate quasi-phosphonium product. End products with P=O and P=S groups are formed, which is associated with the performance of two parallel reactions: 1) via an intermediate quasi-phosphonium product and 2) via substitution of the amido group at the phosphorus atom by the nucleophilic part of the proton donor reactant. It has been demonstrated that in the reaction of gamma-ketoalkylamidophosphites with proton donor reactants, preservation of the P-N bond is possible only when the reaction takes place through an intermediate compound of the quasi-phosphonium type. It has also been demonstrated that the importance of the reaction of substitution of the amido group by the

nucleophilic part of the proton donor reactant increases with an increase in the size of the alkoxy radical at the phoshphorus atom or with its replacement by an amido radical. NMR ^{31}P data have demonstrated that increasing the size of the alkoxy radical at the phosphorus atom retards development of the reaction via the intermediate quasi-phosphonium compound. Because of this, the reaction rate for substitution of the amido group by an SH group can become comparable to or even exceed the rate of the reaction via the quasi-phosphonium product. The reaction of amidophosphites Id and Ie with H_2S and thiophenol can take place chiefly as a reaction of nucleophilic substitution of the amido group by SH or SPh groups.
References 7 (Russian).
[173-8831]

UDC 547.341

REACTIONS OF UNSATURATED COMPOUNDS, PART 82: INTERACTION OF VINYLALLENE PHOSPHONATES WITH ALCOHOLS

Leningrad ZHURNAL OBSHCHEY KHIMII in Russian Vol 52, No 2, Feb 82
(manuscript received 30 Jan 81) pp 277-283

DANGYAN, Yu. M., PANOSYAN, G. A., VOSKANYAN, M. G. and BADANYAN, Sh. O., Institute of Organic Chemistry, Armenian SSR Academy of Sciences

[Abstract] The results are given of a study of the addition of alcohols to vinylallene phosphonates. 0,0-dialkyl-1-vinyl-3-methyl-1,2-butadienyl phosphonates with self-heating easily enter into a nucleophilic addition reaction with alcohols in the presence of a catalytic quantity of the appropriate alcoholate, resulting in 1,4-addition products. The diene phosphonates separated by distillation without removal of the catalyst are stable transparent liquids. Their structure has been confirmed by IR and PMR spectroscopy. The dienes extracted for the most part represent trans-isomers. Monitoring the reaction by means of the gas-liquid chromatography and PMR spectroscopy methods demonstrated that both cis- and trans-isomers of these diene phosphonates form in the process of the reaction. With an increase in the amount of catalyst used and the duration of the process the ratio of isomers increases in the trans-isomer direction. These data demonstrate that the cis-isomer is converted into a trans-isomer in the course of the reaction. It is hypothesized that with the attack of the anion on 0,0-dialkyl-1-vinyl-3-methyl-1,2-butadienyl phosphonates, three carbanions form, of which the most reactive, E and Z, result in products of 1,4-addition. The second slower reaction of isomerization of the cis-isomer into a trans-isomer takes place concomitantly. The trans-isomer is thermodynamically more stable. The diene phosphonates produced are easily hydrolyzed with formation of a mixture of cis- and trans-isomers of α,β-unsaturated phosphoryl-containing ketones with a 1:3 ratio, respectively. Figures 3; references 6: 5 Russian, 1 Western.
[173-8831]

UDC 547.26.118

AMINO ETHERS OF THIOPHOSPHORIC ACID, PART 7: THION-THIOL ISOMERIZATION OF AMINO ETHERS OF TRITHIOPHOSPHORIC ACID

Leningrad ZHURNAL OBSHCHEY KHIMII in Russian Vol 52, No 2, Feb 82
(manuscript received 22 Dec 80) pp 309-316

GUPALO, A. P., KOVAL'CHUK, Ye. P. and KHMIL'OVSKAYA, M. I., L'vov Wood Technology Institute

[Abstract] The results are given of a study of some mechanisms for thion-thiol isomerization of amino ethers of trithiophosphoric acid as a function of the number of methylene groups, the structure of alkyl radicals at the nitrogen and sulfur atoms and the temperature and nature of the solvent. The original amino ethers were produced by alkylation of the appropriate potassium salts of O-(dialkylaminoalkyl)trithiophosphoric acid by means of halogen alkyls. The isomerization rate was studied by means of thin-layer chromatography using a procedure developed for the quantitative determination of substances. The dependence of the rate of thion-thiol isomerization of beta-amino ethers on the concentration, temperature and nature of the solvent was studied by using O-(2-diethylaminoethyl)-S,S-diethyltrithiophosphate (I) as an example. Methyl alcohol was used as the solvent. It was found that the isomerization rate is reduced with a reduction in the concentration of compound I. It is hypothesized that isomerization of beta-amino ethers takes place as an intramolecular reversible reaction of the first order. The irreversible reaction of dimerization of the unstable immonium salt with the formation of a piperazine salt takes place concomitantly. This process occurs more rapidly the higher the concentration of the original amino ether and the higher the temperature. It was found that with an increase in temperature the isomerization reaction rate increases insignificantly and the activation energy for this process is relatively low. The isomerization reaction rate for beta-amino ethers is determined to a considerable extent by the nature of the solvent and increases with an increase in its dielectric constant. The isomerization reaction rate for beta-amino ethers of trithiophosphoric acid depends slightly on the structure of alkyl groups around sulfur atoms, but the structure of groups around the nitrogen atom exerts a considerable influence. It was demonstrated that transformation of O-(3-diethylaminopropyl)-S,S-dipropyltrithiophosphate is of an intermolecular nature and is described by a kinetic equation of the second order for irreversible processes. It was found that O-(4-dialkylaminobutyl)-S,S-dialkyltrithiophosphates are unstable and that O-dialkylaminoalkyl-S,S-dialkyltrithiophosphates can be stabilized by converting them to oxalates. These oxalates are solid crystalline substances which are soluble in water and low alcohols and are insoluble in ether. The original amino ethers can be extracted from them by the effect of potassium hydroxide. Figures 1; references 12: 1 Russian, 11 Western.
[173-8831]

UDC 547.341

STUDIES OF SERIES OF DERIVATIVES OF PHOSPHINIC AND PHOSPHINOUS ACID, PART 105: PHOSPHORYLATED ENAMINES AND THEIR E, Z-ISOMERIZATION

Leningrad ZHURNAL OBSHCHEY KHIMII in Russian Vol 52, No 2, Feb 82
(manuscript received 8 Apr 81) pp 316-322

ALIKIN, A. Yu., LIORBER, B. G., SOKOLOV, M. P., RAZUMOV, A. I., ZYKOVA, T. V. and SALAKHUTDINOV, R. A., Kazan' Chemical Technology Institute imeni S. M. Kirov

[Abstract] Studies are continued on the synthesis and reactivity of phosphorylated enamines belonging to triad systems activated by a phosphoryl group. A series of 11 compounds of this type have been produced and the results are given here of a study of their E, Z-isomerization. The goal of this work is to make it possible to study the composition of isomeric mixtures and the means of E, Z-isomerization and to study the mechanism of reactions of phosphorylated enamines with electrophilic olefins. Enamines with a primary amino group were prepared by admitting ammonia to alcohol or acetonitrile solutions of phosphorylated aldehydes and ketones. It was established by NMR spectroscopy that phosphorylated enamine II with a formula of $C_9H_{20}NO_3P$ exists in the Z-form and products VII, VIII and XI, with formulas of $C_9H_{20}NO_3P$, $C_{12}H_{26}NO_3P$ and $C_{11}H_{24}NO_3P$, respectively, exist in E-form. The remaining compounds are secondary phosphorylated enamines of ketones and are found in the form of a mixture of E- and Z-isomers. The results are presented of studies of the PMR and NMR 31P and NMR ^{13}C spectra of the enamines studied. It is concluded that the E, Z-isomerization of phosphorylated enamines of ketones apparently takes place via the tautomeric imine form, whose lifetime is so short that it cannot be observed directly in NMR spectra. The direction of E- and Z-transformations depends on the nature of the substituents in the enamine triad; they determine the ability to form intramolecular and intermolecular hydrogen bonds. Figures 2; references 11: 8 Russian, 3 Western.
[173-8831]

UDC 541.64 : 547.241

IR SPECTRA AND FEATURES OF CONJUGATION EFFECTS IN COMPLEXES OF OXIDES OF DIARYLMETHYLPHOSPHINES WITH PHENOL IN CCl_4

Leningrad ZHURNAL OBSHCHEY KHIMII in Russian Vol 52, No 2, Feb 82
(manuscript received 21 Jan 81) pp 323-327

SHVETS, A. A., GONCHAROVA, L. V., ZAVIRYUKHINA, N. Ye., MOISEYEVA, O. A., TALANOVA, L. N. and OSIPOV, O. A., Rostov-na-Donu State University

[Abstract] A study is presented of the spectral characteristics of the hydrogen bond implemented in solutions of complexes of phenol with diarylmethylphosphine oxides. Hypotheses are advanced regarding aspects of transfer of the substituent's electron effects to the phosphoryl group. Previous

studies (1980, 1982) had demonstrated that the greatest degree of conjugation of the aromatic ring and phosphoryl group in H-complexes of phenol with monoaryl and triaryl oxides of phosphines is achieved in triaryl compounds in which the phosphoryl group lies outside the plane of the phenyl ring. The diarylmethylphosphine oxides required for the study were produced by two methods: 1) when identical aryl groups are at the phosphorus atom, the individual oxides of phosphine were obtained by the action of arylmagnesium bromide on the dichloroanhydride of methylphosphonic acid and 2) for producing oxides of phosphines with different aromatic groups a reaction was employed for alkali decomposition of iodides of methyltriaryl phosphonium. A study was made of frequencies of hydroxyl absorption of phenol complexes with substituted diarylmethylphosphine oxides. When H-complexes with diarylmethylphosphine oxides are formed, the frequency of hydroxyl absorption is reduced by 340 to 350 cm^{-1} into the low-frequency region in relation to the value of 3612 cm^{-1} in non-associated molecules of phenol. It is demonstrated that both the spectral and energy characteristics of the hydrogen bond depend on the electron nature of the substituent. It is hypothesized that the effects of conjugation in oxides of diarylmethylphosphines are not great and that the influence of the substituent on the reaction center is transmitted primarily through an induction mechanism. It is concluded that the degree of conjugation of the substituent with the phosphoryl group in complexes of diaryl oxides lies midway between that in complexes of monoaryl and triaryl oxides of phosphines. The degree of conjugation of the aromatic ring and phosphoryl group increases successively when going from mono- to di- and triaryl oxides of phosphines. The overall sensitivity of the phosphoryl group to the influence of the substituent diminishes successively in that order. References 9: 5 Russian, 4 Western.
[173-8831]

UDC 547.455 : 546.183

3,5,6-BICYCLOPHOSPHITES OF 6-AMINO-6-DESOXY- AND 3-AMINO-3-DESOXY-1,2-O-ISOPROPYLIDENE-α-D-GLUCOFURANOSE

Leningrad ZHURNAL OBSHCHEY KHIMII in Russian Vol 52, No 2, Feb 82
(manuscript received 17 Dec 80) pp 418-426

RUMYANTSEVA, S. A., KOROTEYEV, M. P., LYSENKO, S. A., SHASHKOV, A. S. and NIFANT'YEV, E. Ye., Moscow State Pedagogical Institute imeni V. I. Lenin; Institute of Organic Chemistry imeni N. D. Zelinskiy, USSR Academy of Sciences, Moscow

[Abstract] A description is given of the production of aminodesoxy sugars containing an amino group at the primary and secondary carbon atoms, i.e., derivatives of 6-amino-6-desoxy- and 3-amino-3-desoxy-1,2-O-isopropylidene glucofuranose. A discussion is then presented of phosphorylation of aminodesoxy sugars and of the properties of the bicyclic amidophosphites produced. Descriptions are given of synthesis for the first time of 3,5,6-bicyclophosphites

based on 6-amino-6-desoxy- and 3-amino-3-desoxy-1,2-O-isopropylidene-α-D-glucofuranose. 6-Amino-6-desoxy-1,2-O-isopropylidene-α-D-glucofuranose (IV) was produced by adding 1.84 g of triphenylphosphine to a solution of 1.44 g of 6-azido-6-desoxy-1,2-O-isopropylidene-α-D-glucofuranose (VI) in 10 ml of absolute pyridine, and then holding the mixture at 20 °C for 2 24-h periods. Then 6 ml of 25-percent aqueous ammonia were added and after 5 h at 20 °C the solution was boiled down and subjected to column chromatography. The entire triphenylphosphine oxide and then compound IV were removed by elution with methanol. The 3,5,6-O,O,N-bicyclophosphite of 6-N-phenylamino-6-desoxy-1,2-O-isopropylidene-α-D-glucofuranose (XIII) was produced by desiccating by means of repeated distillation with absolute benzene a solution of 682 mg of 6-N-phenylamino-6-desoxy-1,2-isopropylidene-α-D-glucofuranose (II) in 10 ml of absolute benzene; then 0.98 ml of dry triethylamine was added to a solution of the substance in 15 ml of absolute benzene. The solution was cooled to 0 to 5 °C and with vigorous stirring 0.20 ml of phosphorus trichloride was added dropwise. The mixture was held at 30 to 50 °C for 1 h and the triethyamine hydrochloride (99 percent) was filtered off. The solution was then vacuum-distilled and the residue was chromatographed. The NMR ^{13}C method was employed to prove the structure of the amino sugars produced and of the products of their phosphorylation. References 16: 4 Russian, 12 Western.
[173-8831]

UDC 547.1'118

SINGLE-ELECTRON TRANSFER IN REACTION OF S-ETHYLDIPHENYLTHIOPHOSPHINITE WITH 1-NITRO-1-PROPENE

Leningrad ZHURNAL OBSHCHEY KHIMII in Russian Vol 52, No 2, Feb 82
(manuscript received 28 Jun 81) p 441

AL'FONSOV, V. A., GAREYEV, R. D., GOL'DFARB, E. I., BATYYEVA, E. S., SHERMERGORN, I. M. and PUDOVIK, A. N., Institute of Organic and Physical Chemistry imeni A. Ye. Arbuzov, Kazan' Branch, USSR Academy of Sciences; Kazan' Veterinary Institute imeni N. E. Bauman

[Abstract] It has been discovered that, in the reaction between S-ethyldiphenylthiophosphinite with 1-nitro-1-propene, only oxidation of the original phosphinite to S-ethyldiphenylthiophosphinate (I) takes place, instead of the simultaneous reactions in different directions usually observed in reactions of alkyl ethers of P^{III} acids with nitroolefins. This reaction takes place through the transfer of a single electron with the formation of an ion-radical pair which is then stabilized either through the recombination of partners or through disproportionation to form compound I. By the NMR ^{31}P method chemical polarization of ^{31}P nuclei was observed in the reaction process both in the original phosphinite and in the final phosphinate, whereby the resonance signal corresponding to the original phosphinite showed negative polarization and the signal for compound I was polarized positively. The composition and structure of compound I were established

by means of elemental analysis data and IR, NMR ^1H and ^{31}P spectra and compound I was produced by counter synthesis by oxidation of S-ethyldiphenylthiophosphinite with manganese dioxide. The constants and spectral data of both specimens agreed. The data obtained demonstrate that when the oxygen atom in the P-O-Alk fragment is replaced by sulfur the reaction direction with the attack of the phosphorus atom on the beta-carbon atom of the nitroolefin is inhibited with formation of the corresponding unsaturated derivative of phosphorus or phosphorane. References 2 (Russian).
[173-8831]

UDC 546.18+547.26'118

REACTION OF ISOCYANATE PHOSPHITES WITH ALKYL AND ARYL ISOCYANATES

Leningrad ZHURNAL OBSHCHEY KHIMII in Russian Vol 52, No 2, Feb 82
(manuscript received 7 Jul 81) pp 443-444

KOZHUSHKO, B. N., SILINA, Ye. B., POVOLOTSKIY, M. I. and SHOKOL, V. A.,
Institute of Organic Chemistry, Ukrainian SSR Academy of Sciences, Kiev

[Abstract] It has been established for the first time that isocyanate phosphites react very easily with alkyl and aryl isocyanates to form a condensed heterocyclic system containing a $1,3,2\lambda^5,4\lambda^5$-diazadiphosphoethidine ring (I). Diazadiphosphoethidines I are colorless crystalline substances insoluble in ether and petroleum ether and slightly soluble in benzene and toluene, but soluble in chloroform and dioxane. They decompose when heated and do not dissolve in cold water. Compounds I are preserved without changes in the crystalline state in a closed vessel. Di- and triisocyanate phosphites react analogously with alkyl and aryl isocyanates. Compounds I are prepared as follows: To a solution of 0.03 mole diethylisocyanate phosphite in 30 ml anhydrous ether is added, at 20 °C while stirring, 0.03 mole alkyl or aryl isocyanate and the mixture is stirred for 20 to 70 h. The colorless residue is removed, washed with anhydrous ether and dried in a vacuum desiccator over P_2O_5. Diazadiphosphoethidines with the following formulas have been produced: $C_{14}H_{26}N_4O_8P_2$, $C_{14}H_{24}Cl_2N_4O_8P_2$ and $C_{24}H_{30}N_4O_8P_2$. The structure of these compounds has been confirmed by measurement of molecular weights cryoscopically in benzene and by IR and NMR ^1H and ^{31}P spectra. Measurement results indicate diazodiphosphoethidines with a 5-coordinated phosphorus atom. References 1 (Russian).
[173-8831]

UDC 547.241

REACTION OF SALTS OF HYPOPHOSPHOROUS ACID WITH EPICHLOROHYDRIN

Leningrad OBSHCHEY KHIMII in Russian Vol 52, No 2, Feb 82
(manuscript received 28 Jul 81) pp 444-445

YUDELEVICH, V. I., FETTER, A. P., KOMAROV, Ye. V. and IONIN, B. I.,
All-Union Scientific Research Technological Institute of Antibiotics and
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[Abstract] A study was made of the reaction between sodium and aniline salts of hypophosphorous acid and epichlorohydrin. The reaction takes place with a 3-fold excess of epichlorohydrin in aqueous ethanol with the formation of 2-oxo-4-oxy-1,2-oxaphospholane (I). There have hitherto been no descriptions of reactions of hypophosphites with halogen-containing small rings and the reaction studied here can be extended to other small rings. The phospholane produced is a transparent, colorless, hard-to-crystallize, undistillable oil which does not exhibit acid properties and reduces aqueous or alcohol solutions of silver nitrite, proving the existence of a P-H bond. References 2 (Russian).
[173-8831]

UDC 547.56+535.34; 542.91

REACTION OF N^1,N^2-DIMETHYL-N^1-CHLOROBENZAMIDINE WITH BUTYLDIFLUOROPHOSPHITE: N^1,N^2-DIMETHYLBENZAMIDINIUMTETRAFLUOROPHOSPHORATE

Leningrad ZHURNAL OBSHCHEY KHIMII in Russian Vol 52, No 2, Feb 82
(manuscript received 18 Aug 81) pp 445-446

MARKOVSKIY, L. N., SINITSA, A. D., KAL'CHENKO, V. I., ATAMAS', L. I. and
NEGREBETSKIY, V. V., Institute of Organic Chemistry, Ukrainian SSR Academy
of Sciences

[Abstract] A study was made of the reaction of N^1,N^2-dimethyl-N^1-chlorobenzamidine with butyldifluorophosphite. This is an exothermic reaction forming short-lived N^1,N^2-dimethyl-N^1-difluorochlorobutoxyphosphoranylbenzamidine (I) which at -30 °C rapidly and practically totally is isomerized into N^1,N^2-dimethylbenzamidiniumdifluorochlorobutoxyphosphorate (II). Compound II is thermally unstable and after a few days at 20 °C it almost totally disproportionates to form the more stable compound N^1,N^2-dimethylbenzamidiniumtetrafluorophosphorate (III) and an unidentified mixture of products. The disproportionation process is sped up at elevated temperatures. Compound III is obtained by adding slowly dropwise a solution of 0.022 mole butyldifluorophosphite in 15 ml chlorobenzene at -30 °C to a solution of 0.02 mole N-chlorobenzamidine in 15 ml chlorobenzene. The reaction mixture is held for 1 h at -30 °C and then for 20 h at room temperature, after which

the solvent is evaporated and the residue is vacuum distilled, after which the product is purified by low-temperature crystallization from a hexane + benzene mixture and by subsequent sublimation under vacuum. The yield is 30 percent in terms of N-chloroamidine and the product has a melting point of 105 to 108 °C with a chemical formula of $C_9H_{11}F_4N_2P$.
References 2 (Russian).
[173-8831]

UDC 547.341

REACTION OF TRIETHYL PHOSPHITE WITH FURFURAL OXIME

Leningrad ZHURNAL OBSHCHEY KHIMII in Russian Vol 52, No 2, Feb 82 (manuscript received 16 Jul 81) pp 448-449

OSIPOVA, M. P., KUZ'MINA, L. V. and KUKHTIN, V. A. (deceased), Chuvash State University imeni I. N. Ul'yanov

[Abstract] By heating triethyl phosphite with furfural oxime to 80 °C, O-substituted hydroxylaminophosphonates were produced. The reaction takes place at the oxime group and is accompanied by migration of a proton from the oxygen to nitrogen. O,O-diethyl-α-(O-ethylhyroxylaminofurylmethyl)-phosphonate was produced with a yield of 39 percent and a boiling point of 70 to 72 °C at 1.5 mm Hg. This compound has the formula $C_{11}H_{20}NO_5P$. When this reaction is carried out under more rigorous conditions, diethylphosphorous acid and the nitrile of furoic acid form.
[173-8831]

UDC 547.341

REACTION OF 2-BROMOETHYLENE COMPOUNDS OF TRIVALENT PHOSPHORUS WITH NITRYLIMINES

Leningrad ZHURNAL OBSHCHEY KHIMII in Russian Vol 52, No 2, Feb 82 (manuscript received 14 Aug 81) pp 451-452

PLATONOV, A. Yu., MAYOROVA, Ye. D., AKIMOVA, G. S. and CHISTOKLETOV, V. N., Leningrad Technological Institute of the Pulp and Paper Industry

[Abstract] Diethyl-2-bromoalkenyl phosphonites were reacted with diphenylnitrylimine produced by thermal decomposition of 2,5-diphenyltetrazene, i.e., under conditions excluding protonation of intermediate ylides. Cyclic products were separated which turned out to be identical to the compounds synthesized from the same bromoalkenyl phosphonites and N^1-α-chlorobenzylidene-N^2-phenylhydrazine in the presence of triethylamine: 1,3,5-triphenyl-4-ethoxy-4-oxo-1,4-dihydro-1,2,4-diazaphosphorine (I) and 6-methyl-1,3,5-triphenyl-4-ethoxy-4-oxo-1,4-dihydro-1,2,4-diazaphosphorine (II). Ethyl

bromide was detected in the reaction mass in a quantity consistent with the yield of the principal product. Diphenylnitrylimine was added to bromo compounds of trivalent phosphorus by boiling in an atmosphere of argon the individual reactants for 1 h in absolute mesitylene, or for 4 h in absolute benzene. The production of a stable phosphonium salt in reactions of diphenyl(2-bromo-1-phenyl)ethinyl phosphine with diphenylnitrylimine generated at the moment of the reaction presents evidence in favor of elimination of the bromide anion by means of cyclic ylides of phosphorus with the formation of quasi-phosphonium salts. References 2 (Russian).
[173-8831]

UDC 547.496.3 : 547.241

HALIDES OF BENZYLARYLPHOSPHONIUM AND THEIR COMPLEXES

Leningrad ZHURNAL OBSHCHEY KHIMII in Russian Vol 52, No 2, Feb 82
(manuscript received 31 Jul 81) pp 458-459

BAGROV, F. V. and VOLKOV, V. D., Chuvash State University imeni I. N. Ul'yanov

[Abstract] It has been demonstrated that complete amides of p-fluoro- and p-dimethyl aminophosphonic acid are easily alkylated in a benzene medium by benzyl bromide with electronegative substituents, i.e., Br and NO_2, in the p-position of the aromatic ring, whereby the following phosphonium salts are formed: tetraethyldiamino-p-bromobenzyl-p-dimethylaminophenylphosphonium bromide (I) and tetraethyldiamino-p-nitrobenzyl-p-fluorophenylphosphonium bromide (II). By boiling I in ethanol, $[Me_2NC_6H_4(BrC_6H_4CH_2)P(NEt_2))]^+Br^-\cdot C_2H_5OH$ (III) is produced and $[Me_2NC_6H_4(BrC_6H_4CH_2)P(NEt_2)_2]^+Br^-\cdot SnCl_2$ (IV) is produced when I interacts with stannous chloride. The compounds separated were studied for structure and individuality by an element analysis for phosphorus and by means of IR and PMR spectra. IR spectra were recorded with an "IKS-14A" spectrometer in vaseline oil and PMR spectra with an "RYa-2308" spectrometer with an operating frequency of 60 MHz with $CHCl_3$ and HMDS as the internal standard. References 2 (Western).
[173-8831]

UDC: 541.63:547.1'118

STERIC STRUCTURE OF PHOSPHORUS-CONTAINING HETEROCYCLES, REPORT 26: SYNTHESIS AND STRUCTURE OF 2-DIALKYLAMINO-1,3,2-DIOXAPHOSPHEPANS WITH PLANAR GROUP OF ATOMS IN RING

Moscow IZVESTIYA AKADEMII NAUK SSSR: SERIYA KHIMICHESKAYA in Russian No 3, Mar 82 (manuscript received 8 Jul 81) pp 588-593

ARBUZOV, B. A., KADYROV, R. A., KLOCHKOV, V. V., ARSHINOVA, R. P., and AGANOV, A. V., Chemical Institute imeni A. M. Butlerov; Kazan' State University imeni V. I. Ul'yanov-Lenin

[Abstract] The authors have begun a systematic study of the conformations of 1,3,2-dioxaphosphepans, the closest analogs to the more thoroughly studied

1,3,2-dioxaphosphorinanes, with a planar group of atoms in the ring. This report presents results of conformational analysis of 2-dialkylamino derivatives by NMR spectroscopy, the method of dipole moments and the Kerr effect. These studies of molecules with a benzene ring or double bond in the ring have shown the presence of conformation equilibrium between the chair form with equatorial position of dialkylamino groups and the twist form.
[184-6508]

UDC: 541.63:541.515:547.1'118

STERIC STRUCTURE OF PHOSPHORUS-CONTAINING HETEROCYCLES, REPORT 28: CONFORMATION OF PHENYL RADICAL IN 5-PHENYL-5-OXO(THIONO)-1,3,5-DIOXAPHOSPHORINANES

Moscow IZVESTIYA AKADEMII NAUK SSSR: SERIYA KHIMICHESKAYA in Russian No 3, Mar 82 (manuscript received 4 Jun 81) pp 594-599

KADYROV, R. A., ARSHINOVA, R. P. and ARBUZOV, B. A., Chemical Institute imeni A. M. Butlerov; Kazan' State University imeni V. I. Ul'yanov-Lenin

[Abstract] A study was made of the conformation characteristics of the phenyl-containing fragment of 5-phenyl-5-oxo(thiono)-1,3,5-dioxaphosphorinanes by means of the Kerr effect. The stereoisomers are convenient objects for study of the rotational isomery of the benzene ring around the P-Ph bond, since they exist in the form of two chair forms with a- and e- position of the phenyl. The Kerr constant was calculated considering the previously established structure of the ring. The Kerr constant was determined as a function of angle of rotation of the phenyl. The Kerr effect data indicated near parallel orientation of the benzene ring plane and the plane of the P=X (X=O,S) bonds. Optimal structural conditions are achieved for resonant interaction of the high orbitals of the phenyl radicals and the P=X bond. Figures 3; references 11: 10 Russian, 1 Western.
[184-6508]

UDC: 541.63:542.91:547.1'118

STERIC STRUCTURE OF 5-PHENYL-5-OXO-2,4,6-TRIISOPROPYL-1,3,5-DIOXAPHOSPHORINANE

Moscow IZVESTIYA AKADEMII NAUK SSSR: SERIYA KHIMICHESKAYA in Russian No 3, Mar 82 (manuscript received 25 Jun 81) pp 599-603

ARBUZOV, B. A., YERASTOV, O. A., LITVINOV, I. A., YUFIT, D. S. and STRUCHKOV, Yu. T., Institute of Organic and Physical Chemistry imeni A. Ye. Arbuzov, Kazan' Affiliate, USSR Academy of Sciences; Institute of Heteroorganic Compounds imeni A. N. Nesmeyanov, USSR Academy of Sciences, Moscow

[Abstract] The structure of an individual stereoisomer of the 5-phenyl-1,3,5-dioxaphosphorinanes (at the P) is studied by x-ray structural analysis. The stereoisomer mentioned in the title has a melting point of 215°C, chair conformation with equatorial orientation of all substituents. The conformation of isopropyl groups relative to the bonds of the ring is hindered. The benzene ring at the P atom is perpendicular to the plane of the heterocycle. Figure 1; references 14: 8 Russian, 6 Western.
[184-6508]

UDC: 541.67:541.63:547.1'118

ANISOTROPY OF POLARIZABILITY AND STERIC STRUCTURE OF TRIPHENYL- AND TRIMESITYLPHOSPHINES, THEIR OXIDES AND SULFIDES

Moscow IZVESTIYA AKADEMII NAUK SSSR: SERIYA KHIMICHESKAYA in Russian No 3, Mar 82 (manuscript received 5 Jun 81) pp 604-607

TIMOSHEVA, A. P., ROMANOV, G. V., VUL'FSON, S. G., VERESHCHAGIN, A. N., STEPANOVA, T. Ya. and PUDOVIK, A. N., Institute of Organic and Physical Chemistry imeni A. Ye. Arbuzov, Kazan' Affiliate, USSR Academy of Sciences

[Abstract] The method of dipole moments, Kerr effect and depolarization Rayleigh scattering of light was used to study compounds of the type Y_3PX, where X = NEP, O and S, Y = Ph or Mes. The molecular ellipsoids of polarizability and conformations of triphenyl and trimesitylphosphine, their oxides and sulfides are presented. The high degree of symmetry of the molecules allows the angles of rotation of aryl radicals to be determined in the axial approximation. The angles of rotation of the aryl radicals around the C-P bonds are quite similar. References 20: 11 Russian, 9 Western.
[184-6508]

UDC: 542.91:547.1'118:547.1'127

INTERACTION OF DIOXYMETHYLPHENYLPHOSPHINE WITH ISOBUTYLESTER OF DIPHENYLBORIC ACID IN PRESENCE OF NITRILES

Moscow IZVESTIYA AKADEMII NAUK SSSR: SERIYA KHIMICHESKAYA in Russian No 3, Mar 82 (manuscript received 25 Jun 81) pp 676-679

ARBUZOV, B. A., YERASTOV, O. A., NIKONOV, G. N., ZYABLIKOVA, T. A., YEFREMOV, Yu. Ya. and MUSIN, R. Z., Institute of Organic and Physical Chemistry imeni A. Ye. Arbuzov, Kazan' Affiliate, USSR Academy of Sciences

[Abstract] The authors previously demonstrated that the reaction of dioxymethylphenylphosphine with isobutylester of diphenylboric acid probably occurs in two stages: the first forms diphenylboryloxymethyl-(oxymethyl)phenylphosphine, after which attachment of formaldehyde arising from the oxymethyl radicals into a P-C-O-B system occurs. The authors therefore study the conditions of separation of the stages and introduce new reagents to the second stage, capable of attaching to the P-C-O-B system. The reaction was studied by NMR spectroscopy. In the presence of nitriles the reaction does indeed occur in two stages, reesterification followed by attachment of nitriles to the P-C-O-B system of the resterification product. References 7: 5 Russian, 2 Western.
[184-6508]

UDC: 542.91:547.1'118

SYNTHESIS OF ETHYL-BIS(N-BUTYL-N-ISOBUTENYLAMIDO)PHOSPHITE AND INTERACTION WITH α-CHLOROACETIC ALDEHYDES

Moscow IZVESTIYA AKADEMII NAUK SSSR: SERIYA KHIMICHESKAYA in Russian No 3, Mar 82 (manuscript received 2 Jul 81) pp 700-702

KIBARDIN, A. M., GRYAZNOV, P. I., GAZIZOV, T. Kh., IRAIDOVA, I. S. and PUDOVIK, A. N., Institute of Organic and Physical Chemistry imeni A. Ye. Arbuzov, Kazan' Affiliate, USSR Academy of Sciences

[Abstract] The ethylester of bis(N-butyl-N-isobutenylamido)phosphoric acid was synthesized by treating N-butyl-N-isobutenylamidodichlorophosphite with N-butylisobutyroimine and subsequent interaction of the bis(N-butyl-N-isobutenylamido)chlorophosphite formed with ethanol in the presence of triethylamine. Further interaction with mono- and dichloroacetic aldehydes and chloral produced bis(N-butyl-N-isobutenylamido)O-vinyl-(III), bis(N-butyl-N-isobutenylamido)O-β-chlorovinyl(IV) and bis(N-butyl-N-isobutenylamido)O-β,β-dichlorovinylphosphate(V). The insecticidal and herbicidal properties of these compounds were studied. The compounds had herbicidal activity, but not insecticidal activity. References 4: 3 Russian, 1 Western.
[184-6508]

UDC: 542.91:541.49:547.1'118

SYNTHESIS AND STUDY OF COMPLEX FORMING PROPERTIES OF XYLYLENEDIAMINOTETRA(METHYLPHOSPHONIC) ACIDS

Moscow IZVESTIYA AKADEMII NAUK SSSR: SERIYA KHIMICHESKAYA in Russian No 3, Mar 82 (manuscript received 11 Aug 81) pp 710-713

POLIKARPOV, Yu. M., BEL'SKIY, F. I., MATVEYEV, S. V., MEDVED', T. Ya. and KABACHNIK, M. I., Institute of Heteroorganic Compounds imeni A. N. Nesmeyanov, USSR Academy of Sciences, Moscow

[Abstract] The m-(I) and p-(II) isomers of xylylenediaminotetra(methylphosphonic) acid were obtained by the usual method. In order to compare the complex forming properties, butyleneditetra(methylphosphonic) acid (III) was also prepared with a flexible alkylene bridge between the nitrogen atoms, whereas the bridges in acids I and II contain 5 and 6 C atoms in the same plane. The acid-base and complex forming properties of the compounds synthesized were studied potentiometrically in water. The position of the complex forming groups in the benzene ring was found to have no influence on the acid-base and complex forming properties of m- and p-isomers of xylylenediaminotetra(methylphosphonic) acid. References 8: 5 Russian, 3 Western.
[184-6508]

PESTICIDES

UDC 546.183

P^{III}-PHOSPHORYLATED HYDRAZONES OF ACETONE

Kiev UKRAINSKIY KHIMICHESKIY ZHURNAL in Russian Vol 48, No 2, Feb 82 (manuscript received 22 Jul 80) pp 196-200

GUSAR', N. I., RANDINA, L. V., PONOMARCHUK, M. P. and GOLOLOBOV, Yu. G., Institute of Organic Chemistry, Ukrainian SSR Academy of Sciences

[Abstract] N-phenyl-N-(dialkoxyphosphino)-hydrazones of acetone were produced by phosphoylation of phenylhydrazone of acetone with dialkylchlorophosphites and the reaction of P^{III}-phosphorylated hydrazones with phenylazide were investigated kinetically. High electron acceptor inductive capability of the $Me_2C = NN(Ph)$ was shown. The interaction of methyldichlorophosphite with phenylhydrazone of acetone in the presence of triethylamine also leads to 2-phenyl-5-methyl-1,2,3-diazaphosphol, produced as a result of splitting of the methyl alcohol molecule from the initially-formed 3-methoxy-2-phenyl-5-methyl-1,2,3-diazaphospholine-5. References 10: 7 Russian, 3 Western.
[147-6521]

UDC 547.78:422.435

INTERACTION OF BENZIMIDAZOLS AND AMINOOXYRANES

Kiev UKRAINSKIY KHIMICHESKIY ZHURNAL in Russian Vol 48, No 2, Feb 82 (manuscript received 5 Sep 80) pp 200-203

SOLOMKO, Z. F., AVRAMENKO, V. I., KHMEL', M. P. and MITYUKHINA, I. G., Dnepropetrovsk State University

[Abstract] The interaction of 2-alkyl(H)-benzimidazols and aminooxyranes-1-diethylamino-2,3-epoxypropane, 1-piperidyl-2,3-epoxypropane and 1-hexamethyleneamino-2,3-epoxypropane, produced by interaction of epichlorohydrin with the corresponding secondary amines and with subsequent treatment of the reaction mixture with caustic soda solution without separation of the

intermediate chlorohydrins, was studied. Derivatives of benzimidazol were produced by condensation of 1-dialkylamino-2,3-epoxypropanes with 2-alkylbenzimidazols. The infrared and paramagnetic resonance spectra of the reaction products were given. References 10: 2 Russian, 2 Polish, 6 Western.
[147-6521]

PETROLEUM PROCESSING TECHNOLOGY

UDC 620.197.3

PROTECTIVE PROPERTIES OF ENGINE OILS AND CORROSION INHIBITORS FOR THEM

Moscow KHIMIYA I TEKHNOLOGIYA TOPLIV I MASEL in Russian No 3, Mar 82
pp 25-27

YERMOLOV, F. N., ENGLIN, A. B., VIGANT, G. T. and ZAKHAROVA, N. N.

[Abstract] The results are given of a study of the protective properties of USSR and foreign engine oils as compared with those of oils used strictly for storing engines and of combination oils which can be used both for operation and storage, as well as of the influence of corrosion inhibitors on them. These results indicate that the protective properties of individual engine oils are poor. Rust-preventive oil K-17 is good for protecting metals from the effect of an external corrosive medium but it has poor water displacement properties. The combination operating-and-rust-preventive oils Prot 20W/M and $M-4z/8V_2G_1$-RK have good protective properties and contain highly effective protective additives. Corrosion inhibiting additives AKOR-1 and KP display good protective properties when tested in sea water and a variable-temperature-and-humidity testing chamber, but they do not improve the water displacement properties of oils, even when added in large amounts. Corrosion inhibitor MSDA-1 cannot be used as an additive for combination operating-and-rust-preventive engine oils because of its corrosive effect on non-ferrous metals at temperatures of 60 and 70 °C and higher. MSDA-1 also loses its protective properties when heated. The polarization resistance method and the method of bringing different kinds of metals with different stationary potentials into contact with one another were employed to obtain data on the protective properties of combination operating-and-rust-preventive and inhibited engine oils. It is concluded that it is necessary to develop corrosion inhibitors which are more effective in terms of their protective properties than AKOR-1, KP and MSDA-1. In addition, corrosion inhibitors must be ash-free or have a low ash content and must be compatible with functional additives and must possess sufficient thermal stability and physical stability and not worsen the basic performance characteristics of engine oils, such as their cleansing, antioxidation, corrosion prevention and wear resistance properties. References 4 (Russian).
[174-8831]

UDC 665.753.2

PHYSICOCHEMICAL PROPERTIES OF KARATYUBINSKOYE OIL AND JET ENGINE FUELS PRODUCED FROM IT

Moscow KHIMIYA I TEKHNOLOGIYA TOPLIV I MASEL in Russian No 3, Mar 82 pp 33-34

KHOKHLACHEVA, M. V., ZAKHARIDI, T. N., ZHMYKHOVA, N. M. and KRYLOVA, S. M., All-Union Scientific Research Institute of Oil Refining

[Abstract] The physicochemical properties of oil from the new Karatyubinskoye field in the Kazakh SSR are as follows: viscosity at 20 °C—19.06 mm^2/s; pour point before heat treatment-- -6 °C, and after heat treatment-- -16 °C; sulfur content in percentage by weight—0.23; gold content—0.08; asphaltene content--1.80; silica gel resin content--7.80; paraffin content—2.98; paraffin melting point—54 °C; coking capacity--2.88 percent by weight; acid number--0.10 mg KOH/g; fractional yield--24.6 percent by weight for the 28-200 °C fraction, 21.9 for the 110-240 °C fraction and 52.1 for the up to 350 °C fraction. Jet fuels of various grades were produced by compounding close-cut fractions extracted in refining the oil in an ARN-2 unit. The 115-240 and 115-250 °C fractions fully satisfy the requirements of GOST [All-Union State Standard] 10227-62 for TS-1 fuel and of GOST 16564-71 for highly stable jet engine fuel. They have high thermal stability under static conditions, a low aromatic hydrocarbon and organic sulfur compound content, and a high heat value and luminometric number. The 50-250 °C fraction meets the requirements of GOST 10227-62 for T-2 fuel with a broad fractional composition. It surpasses the established norms for the content of aromatic hydrocarbons, heat value, thermal stability under static conditions, total and mercaptan sulfur content and height of the sootless flame. The 150-240 °C fraction meets the requirements of TU [Specification] 38-1-257-69 for T-8 hydrofined fuel. It has good density, sootless flame height, heat value and a low organic sulfur compound content, but is at the norm's margin in terms of thermal stability under static conditions. For producing T-8 fuel the appropriate straight-run fraction can be hydrofined for the purpose of improving its thermal stability. [174-8831]

UDC 66.022.37:678.763.43(047)

USE OF COPOLYMERS OF ETHYLENE AND VINYL ACETATE AS ADDITIVES FOR PETROLEUM PRODUCTS

Moscow KHIMIYA I TEKHNOLOGIYA TOPLIV I MASEL in Russian No 3, Mar 82 pp 44-46

IVANOV, V. I., BASHKATOVA, S. T., ZAKHAROVA, E. L. and DINTSES, A. I. (deceased), All-Union Scientific Research Institute of Oil Refining

[Abstract] A survey is presented of the applications of copolymers of ethylene and vinyl acetate as additives for petroleum products. Additives

such as ECA-5920, ECS-4242, ECA-5922 and Elwax are used both as depressor additives for diesel and heating fuels and as dewaxing additives for oils. Depressor additives improve the circulation of diesel, heating and boiler fuels. Copolymers with various molecular weights and a different content of vinyl acetate units in them are employed, depending on the specific area of application. Copolymers with a molecular weight of approximately 2000 and a 30-to-40-percent-by-weight vinyl acetate unit content exert the maximum depressor effect in diesel fuels, and a copolymer with an approximately 20-percent-by-weight vinyl acetate unit content can be used as a dewaxing additive for oils, but is not effective in diesel fuels. The addition of the additive VES-238 to summer diesel fuel makes it possible to lower its pour point to -35 to -60 °C depending on the brand of fuel. The addition of VES-238 to heating fuel in a quantity of 0.05 percent by weight makes it possible to produce winter grades of home heating fuel with a pour point of -30 °C and to lower the cold filterability point by 3 to 7 degrees. Copolymers of ethylene and vinyl acetate having a molecular weight of approximately 20,000 to 30,000 and a vinyl acetate unit content of approximately 24 to 34 percent by weight have been suggested as depressor additives for boiler fuels. The addition of 0.01 percent by weight of an ethylene - vinyl acetate copolymer additive to fuel oil results in lowering of the pour point by 13 degrees and by 40 degrees with a 0.1 percent by weight addition. These copolymer additives also reduce the dynamic viscosity of fuels and have been used successfully in dewaxing of oils and as additives which improve the viscosity index of petroleum oils. A molecular weight of about 5000 and a vinyl acetate unit content of 20 to 26 percent by weight are required for the last purpose. References 56: 46 Russian, 10 Western.
[174-8831]

UDC 615.015.11 : 519.24

QUANTITATIVE RELATIONSHIPS BETWEEN STRUCTURE AND ACTIVITY IN CONSIDERING INCONSTANT CONTRIBUTION OF SUBSTITUENT GROUPS TO BIOLOGICAL ACTIVITY OF CHEMICAL COMPOUNDS

Moscow KHIMIKO-FARMATSEVTICHESKIY ZHURNAL in Russian Vol 16, No 3, Mar 82 (manuscript received 9 Oct 81) pp 325-330

ANTONOV, N. S., GEVENYAN, M. I. and TSEYROVA, L. T.

[Abstract] The authors cite data to the effect that the contribution, to a molecule's biological activity, of an identical replacing group at the same position may depend on the activity of the initial compound and the composition and site of other substituents groups in its molecule. They give examples of changes in toxicity of cardiac glucosides (a) by replacement of a formyl group by a hydroxymethyl group at position C_{10} in genine and (b) toxicity of aglycones and products of their esterification by L-rhamnose at the C_3 hydroxy-group. These toxicity changes are tabulated. Experimental data are presented which suggest that every substituent brings its own change in the biological activity of the original molecule, and the magnitude and dimensions of those changes depend on some constant indicator of biological activity. Consequently, the change in activity should be predictable from knowledge of the nature of the substituent. Theoretical calculations are presented to exemplify this predictability. Figure 1; references 7: 1 Russian, 6 Western.
[180-12131]

UDC 615.214 : 547.467.1]012.1

SYNTHESIS AND BIOLOGICAL ACTIVITY OF ESTERS AND HYDRAZIDES OF PHOSPHORYLATED PHENYLACETIC ACIDS

Moscow KHIMIKO-FARMATSEVTICHESKIY ZHURNAL in Russian Vol 16, No 3, Mar 82 (manuscript received 6 Oct 81) pp 296-300

ISMAGILOV, R. K., RAZUMOV, A. I., ZHURAVLEVA, G. G., ZYKOVA, V. V., YAFAROVA, R. L. and BEZBORODOVA, T. A., Kazan' Chemical and Technological Institute imeni S. M. Kirov; Mariyskiy University, Yoshkar-Ola

[Abstract] Continuing earlier related studies (KHIMIKO-FARMATSEVTICHESKIY ZHURNAL No 4, Apr 78 pp 79-83), the Arbuzov regrouping method was used to study the regrouping of ethyl esters of diethyl(and diphenyl)phosphonous acid under the action of ethyl esters of alpha-chloro(or bromo)phenylacetic acid. The structure of the products obtained was confirmed by nuclear magnetic resonance spectroscopy of ^{31}P, ^{1}H and ^{13}C. After their production, the products were tested for pharmacological value as sedatives for mice that had been subjected to electric shocks. Results indicated that the hydrazides of alpha-diethylphosphinylphenylacetic acid and of alphadiphenylphosphinylphenylacetic acid did not have anti-cramping effects; the former had no effect on the orientation reaction or on muscular strength, while the latter suppressed both these functions. Details of the chemical procedures are presented in the chemical experimental section. Figure 1; references 6: 3 Russian, 3 Western.
[180-12131]

UDC 615.2 : 547.834.4] .015.4

SYNTHESIS AND PHARMACOLOGICAL PROPERTIES OF 2-SUBSTITUTED 3-ARYL-3-HYDROXYQUINUCLIDINES

Moscow KHIMIKO-FARMATSEVTICHESKIY ZHURNAL in Russian Vol 16, No 3, Mar 82 (manuscript received 19 May 81) pp 307-311

BONDARENKO, V. A., TRUBITSYNA, T. K., ANISIMOVA, O. S., MIKHLINA, Ye. Ye., MASHKOVSKIY, M. D. and YAKHONTOV, L. N., All-Union Scientific Research Chemical and Pharmaceutical Institute imeni S. Ordzhonikidze, Moscow

[Abstract] The title compound, which had not previously been described in the literature, was obtained by reacting 2-methylene-3-hydroxoquinuclidine with phenylmagnesium bromide. When the reaction mixture was treated with hydrochloric acid a hydrochloride of 2-hydroxymethyl-3,3-dioxyquinuclidine resulted. Hydrochlorides and methiodides of 2-methylene-3-aryl-3-hydroxyquinuclidines were studied for their effect on adrenal and choline systems and as antiarhythmics, local anesthetics, cough suppressants and analgesics. None had adrenomimetic or antiarhythmic effects. In toxic doses to mice

they caused breathing difficulties, slight tremors and cramps that increased with larger doses. One of the compounds, which was regarded to be a bicyclic analog of ephedrine, did not have the compound's stimulating effects. Thus the pharmacological value of these compounds was minimal. Details of the procedures used in synthesis are given in the experimental chemical section. REferences 11: 4 Russian, 7 Western.
[180-12131]

UDC 614.72:661.64]:613.155.3

REVIEW OF MAXIMUM PERMISSIBLE CONCENTRATION OF ARSENOUS OXIDE IN ATMOSPHERIC AIR OF POPULATED POINTS

Moscow GIGIYENA I SANITARIYA in Russian No 1, Jan 82
(manuscript received 7 Apr 81) pp 6-9

KAMKIN, A. B., Sverdlovsk Scientific Research Institute of Labor Hygiene and Occupational Diseases

[Abstract] The toxic, embryotoxic and mutagenic effect of low concentrations of arsenic trioxide was studied during inhalation by rats. Chronic exposure of rats resulted in general toxic effects manifested in impaired function of the central nervous system, inhibited activities of a number of blood enzymes, accumulation of arsenic and histopathological changes in the parenchymatous organs. A concentration of 30 and of 3.0 micrograms per cubic meter also produced mutagenic and embryotoxic effects in the experimental animals. An arsenic trioxide concentration as low as 1.0 microgram per cubic meter had this embryotoxic action. A concentration of 0.3 microgram per cubic meter is recommended as the average annual maximum permissible level in the atmospheric air of populated points since it has no general toxic, mutagenic and embryotoxic effect. References 4: 3 Russian, 1 Western.
[131-6521]

UDC 614.73:615.31:546.79].033

ESTIMATING INHALATION ABSORPTION AND ACCUMULATION OF RADIOACTIVE SUBSTANCES IN NUCLEAR POWER PLANT REPAIR PERSONNEL

Moscow GIGIYENA I SANITARIYA in Russian No 1, Jan 82
(manuscript received 26 Mar 81) pp 29-31

VOROB'YEV, A. M., KOROTKOV, V. T., SIMAKOV, A. V., TSOV'YANOV, A. G. and STARODONOVA, N. P.

[Abstract] The inhalation absorption and accumulation of radioactive substances in repair personnel at nuclear power plants was determined and the

internal radiation dose was evaluated during work related to replacing the cutoff-control valves and spherical water flow regulators and repair of the main circulating pumps and separator drum at a nuclear power plant with an RBMK-1000 reactor. The inhalation absorption of β- and γ-radioactive substances comprises $2 \cdot 10^{-9}$ to $8 \cdot 10^{-9}$ curies per day and absorption of α-active substances comprises $1 \cdot 10^{-13}$ to $3 \cdot 10^{-13}$ curies per day. The absorption and accumulation were dozens and hundreds of time less than the maximum permissible dose. The annual accumulation of cesium-144 in the lungs comprises 16,000 picocuries, that of cobalt-60 comprises 8,000 picocuries, that of niobium-95 comprises 3,000 picocuries and the absorption of -emitters comprises 2 picocuries in the lungs of repair personnel. The accumulation is approximately one order less in the skeletal bones, which is much less than the maximum permissible concentration. The calculated doses of internal radiation are equal to approximately 100 millirads per year to the lungs and 10 millirads per year to the skeletal bones, also dozens and hundreds of times less than the maximum permissible dose. References 4: 1 Russian, 3 Western.
[131-6521]

POLYMERS AND POLYMERIZATION

UDC 677.494.743.21-96

PRODUCTION OF FLUORINE-CONTAINING F-50 THREADS BY EXTRUSION FROM MELT

Moscow KHIMICHESKIYE VOLOKNA in Russian No 1, Jan-Feb 82
(manuscript received 23 Jun 80) pp 13-14

KRONFEL'D, A. M., YEROKHOVA, V. A., LOGVINOV, A. I., LOGINOVA, N. N., BEZPROZVANNYKH, A. V., PANSHIN, Yu. A. and VOL'F, L. A.

[Abstract] The fiber-flowing properties of F-50 fluoropolymer and formation of complex and monofilaments from it by extrusion of melt were investigated. The nature of flow of the F-50 melt and the main parameters of formation were established by differential thermal analysis. The filaments form at melting point of 340-360°C and at shear stress of not more than 450 kPa. Complex and monofilaments of F-50 are processed by traditional methods and can be used in the chemical industry, in the electrical engineering industry, in the shipbuilding industry, as an antifriction material and so on. The filaments are of specific interest to medicine due to their biological inertness. Figures 2; references 3 (Russian).
[148-6521]

UDC 677.022.78:677.017

EFFECT OF LASER HEAT TREATMENT ON STRUCTURE AND PROPERTIES OF CHEMICAL FILAMENTS

Moscow KHIMICHESKIYE VOLOKNA in Russian No 1, Jan-Feb 82
(manuscript received 8 Dec 80) pp 32-33

PUTNA, V. P., ZHIYEMYALIS, R. F. and PAKSHVER, A. B.

[Abstract] Changes in the structure of chemical filaments exposed to laser and to heat treatments during texturization were investigated by the false twisting method. Structural changes were determined by critical dissolution times, shrinkage during boiling, nonequilibrium, x-ray and infrared spectroscopy. Laser treatment differs from ordinary heat treatment by the fact that

during laser treatment the greatest structural changes occur on the surface layer rather than through the entire cross-section of the fiber. The strong surface effect of laser treatment may explain the high nonequilibrium of texturized filaments. References 5 (Russian).
[148-6521]

UDC 620.197:678.067.7

USE OF CARBON FIBERS IN CHEMICALLY STABLE APPARATUS

Moscow KHIMICHESKIYE VOLOKNA in Russian No 1, Jan-Feb 82
(manuscript received 23 Feb 81) pp 36-37

CHUKALOVSKIY, P. A., KONKIN, A. A., KUTSEBA, S. A., MELESHKO, A. I.
and FOMINA, N. I.

[Abstract] The effect of carbon fibers on the chemical stability of composite materials based on them is considered as a possibility of replacing stainless steels with structural polymer materials. A hybrid structural material was developed that combines the positive properties of glass-fiber-reinforced material with increased chemical stability of karboplast. The physical mechanical properties of the hybrid material are presented. The use of carbon fibers increases the operating life of articles based on them by a factor of 3-13 and results in an increase of the mean cycles between repair of equipment. A preliminary saving of 13,000 rubles is calculated due to the use of the hybrid composite material. The saving is increased to 35,000 rubles per ton of material if homogeneous leaded steel is replaced by the synthetic material. References 4 (Russian).
[148-6521]

UDC 678.043.6.678.01.539.3.4

SELENIUM SULFIDE OXIDE VULCANIZATION OF CHLOROPRENE RUBBER

Baku AZERBAYDZHANSKIY KHIMICHESKIY ZHURNAL in Russian No 6, Nov-Dec 81
pp 73-75

AKHMEDOV, G. G., BABAYEV, R. Kh., GASANOV, T. G., ATAKISHIYEV, N. K. and
ABDYYEV, O. B., Institute of Chloroorganic Synthesis, AzSSR Academy of Sciences

[Abstract] Since vulcanates obtained by vulcanizing chloroprene rubber with bivalent metal oxides have relatively low levels of sub-vulcanization, and, sulfur oxide systems in the presence of Captax reduce thermal durability and vulcanization at 300% stretching, the authors studied the effects of selenium sulfides on physicomechanical properties of resins and blends based on chloroprene rubber. It was found that reducing sulfur content enabled

increased vulcanization at 300% stretching, while reducing residual stretch and shortening the time before sub-vulcanization began. In combination with Captax, selenium sulfide produced high performance rubbers while permitting relatively low vulcanizing temperatures. References 5: 4 Russian, 1 French (patent).
[186-12131]

UDC 678.046 : 539.612

STRUCTURAL CHANGES IN HIGH DENSITY POLYETHYLENE MODIFIED BY SILICON-CONTAINING MINERAL FILLERS

Baku AZERBAYDZHANSKIY KHIMICHESKIY ZHURNAL in Russian No 6, Nov-Dec 81 pp 76-82

ALIGULIYEV, R. M., Azerbaijan State Medical Institute imeni N. Narimanov

[Abstract] Polymer interaction with fillers can be characterized by physical adsorption, chemical reaction or both, depending on surface chemistry of the fillers, surface energy, the presence of lyophil particles and other factors. The authors studied fine-dispersion quartz, powdered silica gel, asbestos powder and kaolin in high density polyethylene crystalline structure to determine effects on crystallite dimensions, degree of crystallinity and elementary cellular parameters. For all fillers, an insignificant concentration level which brought increased effective dimensions was noted; for all but kaolin, a sharp decline was observed in this parameter after a certain level of concentration (15% for quartz fillers, 8-10% for others). With 15-20% filler material crystallinity fell below that of the original polymer. Thermodynamic factors were the chief determinant for crystallite dimensions at low filler concentrations. The latter two factors seemed related to declines in the segmental mobility of macromolecules in the hard surface. As the filler surface quantity grew, the quantity of the polymer in the layer where kinetic and spatial factors hampered crystallization increased and the general degree of crystallinity fell. Data of differential thermal analysis confirmed changes in thermal characteristics for the fillers tested. The best filler was judged to be quartz particles, although powdered silica gel gave similar spherulite fineness and homogeneity. Figures 4; references 14: 12 Russian, 2 English.
[186-12131]

RUBBER AND ELASTOMERS

UDC 678.762.3

ELASTOPLASTIC PROPERTIES OF SKI-3 AND SKI-3-01 RUBBERS

Moscow KAUCHUK I REZINA in Russian No 3, Mar 82
(manuscript received 22 Jun 81) pp 5-6

SIRE, Ye. M., AFANAS'YEV, S. V., KAMAYEVA, O. A. and POSPELOVA, L. M.,
Tol'yatti "Sintezkauchuk" Production Association

[Abstract] The modified resin SKI-3-01, in contrast to the original SKI-3 resin, contains diphenylamine groups attached to the polymer chains. Plasticity (P) and Mooney viscosity (M) are measured over a wide interval for samples of these two resins. The concentration of bound p-nitrosodiphenylamine in the SKI-3-01 is about 0.25%. P is related to M by the equation

$$M = a - b \cdot P$$

where a and b equal 133 and 158 respectively for SKI-3 or 165 and 222 respectively for SKI-3-01. The greatest difference in M is observed for P approximately equal to 0.30. The difference decreases for increasing P and disappears about P = 0.50, that is for lower molecular masses. Figure 1; references 6 (Russian).
[178-12027]

UDC 678.4:678.011:678.046

MODIFICATION OF SKI-3 RESIN WITH 2-HYDROXY-3-CHLOROPROPYLACRYLATE

Moscow KAUCHUK I REZINA in Russian No 3, Mar 82
(manuscript received 10 Jul 81) pp 6-7

BUTUSOVA, N. R., KOSTRYKINA, G. I., ZAKHAROV, N. D. and POLYAK, M. A.,
YaPI [Expansion unknown]

[Abstract] The addition of 2-hydroxy-3-chloropropylacrylate (OCPA) in the range 1.0 to 5.0 parts per 100 parts resin plus sulfur (2.5%), santokyur

(1.2%), zinc oxide (5.0%), and technical carbon black (trademark 75-50) to SKI-3 and natural rubber changes the relationship between % elongation and stress. The cohesive strength of the modified SKI-3 resins is higher than that for the unmodified resin and is close to that of natural rubber containing 3 wt % OCPA. Apparently this is due to the interaction between the SKI-3 and the carbon black which influences gel formation. Infrared spectroscopy was used to study the interaction between the resin and the carbon black. Other properties of the resin, such as resistance to tearing, strength under stress and hysteresis losses, improve somewhat with increasing cohesive strength. Figure 1; references 7: 6 Russian, 1 Western.
[178-12027]

UDC 678.044.001.5:678.762.2-134.532

EFFECT OF RECEPTOR FACTORS ON REACTION EFFICIENCY OF ZINC DIALKYLDITHIOPHOSPHATE AS VULCANIZATION ACCELERATOR FOR SYNTHETIC BUTADIENE-NITRILE RUBBER

Moscow KAUCHUK I REZINA in Russian No 3, Mar 82
(manuscript received 25 Mar 81) pp 15-16

OVCHAROV, V. I., BLOKH, G. A., BLIZNYUK, T. G. and SAVENKO, A. I.,
Dnepropetrovsk Chemical Technological Institute imeni F. E. Dzerzhinskiy;
Belaya Tserkov' Technical Resin Products Plant

[Abstract] Data are reported on sulfur vulcanization of synthetic butadiene-nitrile rubber (SBR) for the two systems sulfur + accelerator and sulfur + accelerator + zinc dialkyldithiophosphate (Zn-DADTP). Accelerators considered include diphenylguanidine, Alta (a dibenzothioazole), thiuram, cimate, sulphenamide Ts and dithiodimorpholine. Except for the cimate + SBR system, the addition of Zn-DADTP to the reaction decreases the time to incipient vulcanization and increases the vulcanization rate. The magnitude of the accelerating affect is consistent with other accepted indications of chemical reactivity. The products obtained from the sulfur + accelerator + Zn-DADTP reaction show satisfactory physical-mechanical properties, are stable towards thermal aging and have strength and relative elongation values compatible to those of products obtained from the conventional single-accelerator systems. Figures 3; references 7 (Russian).
[178-12027]

UDC 518.283

ADAPTIVE OPTIMAL DIGITAL CONTROL SYSTEM FOR POLYMERIZATION UNITS IN PRODUCING DIVINYL-STYRENE RUBBER

Kiev KHIMICHESKAYA TEKHNOLOGIYA in Russian No 2, Mar-Apr 82 pp 31-33

AZHOGIN, V. V., ZGUROVSKIY, M. Z. and RUDENKO, S. S.

[Abstract] The emulsion polymerization process is crucial to high quality economical production of the title rubber; the authors have developed an algorithm for controlling this exothermal system that takes into account flow of cooling agents, mix of components and other production factors. The mathematical model was developed by first selecting a structure for the polymerization process system and identifying its parameters, and then optimizing the process functions using this model. The model was tested in the production of divinyl-styrene rubber, where it was used to determine that 80% of the costs of production were for raw materials and components of the aqueous phase of the process, and 19% were for degassing, coagulating and drying the rubber. The algorithm was judged to be simple and readily implemented on computers, and applicable to other multi-stage processes. Figures 2; references 3 (Russian).
[183-12131]

CSO: 1841

- END -

JPRS 81517

12 August 1982

USSR Report

CHEMISTRY

No. 89

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12 August 1982

USSR REPORT

CHEMISTRY

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ADSORPTION

UDC: 546.49-121:621.039.75

ADSORPTION OF METALLIC MERCURY VAPOR BY ACCUMULATING POLYMER COATINGS

Leningrad ZHURNAL PRIKLADNOY KHIMII in Russian Vol 55, No 4, Apr 82
(manuscript received 17 Aug 79) pp 850-855

KONDRAT'KO, M. Ya., SIMANOVSKIY, Yu. M., KHOKHREKOV, V. I. and
SHTAN'KO, V. I.

[Abstract] A study is made of the static adsorption of metallic mercury vapor in certain compositions of accumulating protective polymer coatings containing an aqueous solution of polyvinyl alcohol or a polyvinyl acetate emulsion as the film-forming base. The method of radioactive indicators with ^{203}Hg as the label was used in an experimental installation which blew mercury vapor past suspended plates carrying the material studied. The experimental data allow estimation of the coefficients of diffusion of mercury in the coating substances. The most effective coating composition for adsorption and firm holding of atomic mercury must combine a sufficient concentration of a chemically active sorbent such as MnO_2 with a porous open structure of the polymer film. Optimal formulas can be sought by the use of surface-active agents and gel formers or foam-forming agents to increase the working surface. The coatings studied, if applied in a room with a volume of 1000 cubic meters and a total surface of about 6000 square meters, could absorb up to 35-40% of the total mercury in the air at the saturated vapor pressure. The use of forced ventilation would improve the effect still further. Figures 4; references 5: 4 Russian, 1 Western.
[232-6508]

UDC 678.13 · 546.18 : 543.42

SPECTROPHOTOMETRIC STUDY OF REACTION OF ACRYLONITRILE COPOLYMER, METHACRYLATE, ITACONIC ACID AND PHOSPHOMOLYBDIC HETEROPOLY ACID IN DIMETHYLFORMAMIDE SOLUTIONS

Tashkent UZBEKSKIY KHIMICHESKIY ZHURNAL in Russian No 1, Jan-Feb 82
(manuscript received 5 Dec 80) pp 21-23

KHASANOVA, M. R., STREL'NIKOVA, G. B. and GELLER, A. A., Tashkent Institute of Textiles and Light Industry

[Abstract] Changes in the nature of the solvent such as introduction of dimethylformamide fundamentally change reactions between phosphato- and molybdathions, with the pH of the solution playing a large role. The authors studied the reaction of acrylonitrile ionometric copolymers with heteropoly acid in dimethylformamide by spectrophotometry, including the title compounds, in the proportion of 92.5% acrylonitrile, 6.2% methacrylate, and 1.3% itaconic acid. The spectra of the solutions in dimethylformamide with constant heteropoly acid concentration indicated that with increased copolymer amounts there was a hypsochromic shift in light passage at lambda = 295--300 nm, and band "washout" at 315 nm. The negative correlation of optical density deviation to the heteropoly acid/copolymer ratio suggests complex molecular reactions in the solution that lead to new complex compounds. Figures 3; references 4 (Russian).
[208-12131]

UDC: 546.791.4

INTERACTION PRODUCTS OF URANIUM (IV) TETRAFORMIATE AND NITROGEN-DONOR LIGANDS

Moscow ZHURNAL NEORGANICHESKOY KHIMII in Russian Vol 27, No 4, Apr 82
(manuscript received 8 Sep 81) pp 849-852

SPITSYN, V. I., DUNAYEVA, K. M., MAZO, G. N. and SANTALOVA, N. A., Moscow State University imeni M. V. Lomonosov

[Abstract] This work continues studies of the products of interaction of uranium (IV) carboxylates and uranyl with N-donor ligands with low

temperature of decomposition to uranium dioxide. The interaction of uranium (IV) tetraformiate with ammonia and methylamine under a vacuum was studied by heterogeneous synthesis in a solid-gas system. Formation of the compounds is represented as a multistage reaction of ammonolysis, the first stages including coordination of RNH groups to uranium accompanied by liberation of an RNH_3OOCH molecule. This is followed by a stage of formation of oxo bridges leading to dimerization of the complex. The coordination of substituted amino groups by uranium causes loss of equilibrium of the C-O bond of the island HCOO groups, facilitating formation of RNHCHO and, following intramolecular regrouping, development of the final complex in which, in addition to the oxo bridge connecting two uranium atoms, there are also oxygen atoms bonded to one atom of uranium like uranyl groups. The behavior of the compounds upon thermolysis confirms the assumptions made.
References 9: 7 Russian, 2 Western.
[204-6508]

UDC: 543.544:543.4

CHROMATIC-FLUORIMETRIC METHODS OF DETERMINING MICROQUANTITIES OF ORGANIC SUBSTANCES

Moscow ZHURNAL ANALITICHESKOY KHIMII in Russian Vol 37, No 4, Apr 82 (manuscript received 23 Jun 80) pp 701-743

KOSTYUKOVSKIY, Ya. L. and MELAMED, D. B., Institute of Nutrition, USSR Academy of Medical Sciences, Moscow

[Abstract] Fluorimetric methods can in principle perform tasks which are difficult by other methods. They are particularly promising for determination of traces of organic substances. This review of chromatic-fluorimetric methods (CFM) covers methods combining chromatographic separation of substances with fluorimetric determination. An important feature of CFM is the possibility of producing fluorescent derivatives both before and after chromatographic separation, using all types of chromatographic separation including paper, thin layer, liquid and gas chromatography in all their varieties. CFM are suitable for both identification and quantitative determination of substances. This review summarizes a large number of the many widely varied sources of literature on the application of CFM for determination of microscopic quantities of organic substances. The information is classified by chemical reactions upon which the methods are founded. Extensive tables are presented summarizing the range of substances analyzed and the characteristics of the methods in question. References 224: 54 Russian, 170 Western.
[230-6508]

UDC: 543.257.1:543.80

DETERMINATION OF IMPURITIES IN DI(2-ETHYLHEXYL)PHOSPHORIC ACID

Moscow ZHURNAL ANALITICHESKOY KHIMII in Russian Vol 37, No 4, Apr 82 (manuscript received 5 Jan 81) pp 744-747

IGNATENKO, A. V., PASTUKHOVA, I. V., PETROV, K. A., SMELOV, V. S., CHAUZOV, V. A. and SHMIDT, V. S.

[Abstract] A search is undertaken for a reliable and simple method to determine the content of the primary substance and organophosphorus impurities in technical di(2-ethylhexyl)phosphoric acid. The composition of the acid was determined by calculation of the weights of acid and alkaline hydrolysates as well as the results of potentiometric titration of the initial specimen, the acid and alkaline hydrolysates using equations presented in the article. The method of ^{31}P NMR spectroscopy is used to determine the content of the components in the technical acid to confirm the accuracy of the method described above. It is found that the acid contains mono(2-ethylhexyl)-phosphoric acid, tri(2-ethylhexyl)phosphate, tetra(2-ethylhexyl)pyrophosphate and sym-di(2-ethylhexyl)pyrophosphoric acid. Figure 1; references 3 (Russian).
[230-6508]

UDC: 639*863.1:628.517:681.31

PROGRAM FOR COMPUTER CALCULATION OF EXPECTED NOISE LEVELS IN PRODUCTION AREAS OF MICROBIOLOGICAL ENTERPRISES

Moscow GIDROLIZNAYA I LESOKHIMICHESKAYA PROMYSHLENNOST' in Russian No 3, 1982 (signed to press 9 Apr 82) pp 21-23

TATSI, L. A., KUZ'MICHEV, V. V. and TSYGAL'NITSKIY, V. M., "Gidrolizprom" Scientific Production Association

[Abstract] A computer program is presented in flow chart form for the calculation of expected noise levels in production areas resulting from the operation of equipment most commonly used in the microbiological industry today. Spectral noise power characteristics of several typical machines such as compressors, blowers and cutting machines are presented in tabular form. The program currently runs on a BESM-4M computer, in which memory size limits the number of points at which the noise level can be simultaneously calculated to 5. This limitation is overcome by dividing the rim into strips and calculating noise levels independently for each strip. In the future the program is to be run on more modern SM computers, allowing an increase in the number of points calculated to 50, the number of types of sound insulation for which calculations are performed from 2 to 3. Figure 1; references 5 (Russian).
[234-6508]

UDC 677.529.03: 662.749.38 + 677.021.12

HYDROCARBON FIBERS BASED ON MESOPHASE PITCHES

Moscow KHIMICHESKIYE VOLOKNA in Russian No 2, Mar-Apr 82
(manuscript received 12 May 81) pp 9-15

AZAROVA, M. T., SEMYAKINA, N. S., KONKIN, A. A. and TIKHOMIROVA, M. V.

[Abstract] Hydrocarbon filaments come largely from cellulose hydrate and polyacrylonitrile, which are expensive. The authors studied results obtained by such manufacturers as Union Carbide in producing these fibers from isotropic amorphic pitches. Obtaining hydrocarbon fibers from mesophase pitches is complicated by the two-phase, unmixed nature of the substances. High temperature petroleum cracking is being used to obtain initial fibers, which are then processed at very high temperatures (above 2500° C). Mesophase pitches form with a number of aromatic condensed compounds and impurities that lead to a defective, chaotic structure. The authors found that a system with low average molecular mass in the anisotropic portion, with 40-60% pitch mesophase, was a favorable form. Its formations would have "onion ring," radial and disorderly cross sections; the latter form was found to be best. Hydrocarbon fibers with superior mechanical properties were produced by thermal processing at 2500°+ C, yielding a highly oriented structure similar to graphite fibers, at much lower cost. Figures 5; references 41: 3 Russian, 38 Western.
[209-12131]

UDC 541.128 : 547.313.3

NATURE OF ACTIVE CENTERS AND MECHANISM OF OLEFIN METATHESIS ON APPLIED OXIDE CATALYSTS OF MOLYBDENUM, TUNGSTEN AND RHENIUM

Moscow KINETIKA I KATALIZ in Russian Vol 23, No 2, Mar-Apr 82
(manuscript received 8 Dec 80) pp 276-290

KADUSHIN, A. A., ALIYEV, R. K., KRYLOV, O. V., ANDREYEV, A. A., YEDREVA-KARDZHIYEVA, R. M. and SHOPOV, D. M., Institute of Chemical Physics, USSR Academy of Sciences; Institute of Organic Chemistry, Bulgarian Academy of Sciences, Sofia

[Abstract] The authors undertook a systematic study of the effects of the carrier, activation conditions and the reaction itself on the formation and structure of active centers. Spectral characteristics of the systems studied were compared by infrared, ultraviolet, X-ray-electron and electron absorption spectroscopy, and X-ray-phase and chromatographic analyses. Catalytic activity in a metathesis reaction of propylene and butene-1 was tested in a quartz flow reactor at atmospheric pressure in a temperature range of 25-600° C, with contact time of 3-50 seconds. The deposited oxide catalysts of the title minerals are discussed in terms of preparing the catalysts, studying their activity, and observing optical spectra. Tungsten ions were found to reduce at higher temperatures than molbydenum ions. Olefin treatment brought reduction of rhenium to lower oxidation levels. The low activities of Re_2O_7/MgO at low temperatures is related to difficult electron transfer. The studies indicated the presence of a mobile center in the metathesis of olefins for oxide catalysts of all 3 title minerals, which is dependent on the chemical nature of the carrier and its crystalline structure. Figures 9; references 33: 8 Russian, 1 Bulgarian, 24 English.
[219-12131]

ELECTRONIC FILMING METHOD RECORDS ATOMIC MOTION

Vilnius SOVETSKAYA LITVA in Russian 13 Apr 82 p 2

[Article by V. Yel'makov: "A New Research Method"]

[Text] A film which was shot in a total of just 1 second in one of the scientific laboratories of Novosibirsk laid the basis for a new scientific research method. This unusual strip of film described the life of atoms in crystals.

Instead of the X-ray tubes used to photograph motionless atomic structures, scientists at the Academy City in Novosibirsk employed synchrotron emissions (born in accelerators) that were a thousand times brighter. By achieving such hign illumination of the "filming stage," the scientists were able to film movements of atoms.

"The role of a motion picture camera is played in our research by a device capable of recording and transmitting 1,000 roentgenograms to a computer memory each second," explains scientist B. Tolochko of the Institute of Solid State Chemistry. This speed is sufficient to follow the movements of atoms in crystals and molecules of a substance undergoing deformation, heating or cooling, and in chemical reactions lasting fractions of a second.

Representatives of various sciences have displayed interest in the electronic movie. The new scientific research method is attracting more and more proponents. In the opinion of scientists, with time it may become an effective tool for developing more economical production processes in metallurgy, chemistry and other industrial sectors.

11004
CSO: 1841/229

LATVIAN STOCK BREEDERS TO RECEIVE MORE LYSINE ADDITIVE

Moscow SOTSIALISTICHESKAYA INDUSTRIYA in Russian 28 Apr 82 p 1

[Article by V. Volodin: "The Fruits of Cooperation"]

[Text] Latvian stock breeders understand the worth of a new biological additive to forage rations--lysine. After all, just 1 kilogram of this substance, when competently used in the feed of farm animals, can produce an additional 40-50 kilograms of meat.

Lysine is produced in the republic by the Livany Biochemical Plant. Its planned output has been doubled. Now stock breeders will receive hundreds of tons more lysine than planned from Baltic biochemists each year.

11004
CSO: 1841/229

NEW VISCOSE FIBER LINE INSTALLED IN RYAZAN'

Moscow SOTSIALISTICHESKAYA INDUSTRIYA in Russian 11 May 82 p 2

[Article by Correspondent V. Starostin: "Ryazan' 'Cotton'"]

> [Text] The country's largest flow line producing high-modulus viscose staple fiber has been put into regular production at the Ryazan' Chemical Fiber Plant. Articles made from such fiber keep their shape excellently, and they are a time and a half stronger than ordinary staple fabrics; they are hygroscopic, and they combine within themselves the best properties of cotton and viscose fibers.

There was a short moment of silence in the spinning and finishing shop before the new flow line was started up, as if just before a long and hard road. The installers, adjusters and planners had gone, and only here and there along the line, which extended the entire length of the plant's bay could its future masters--the operators--be seen fussing with the equipment, getting used to the unusual and as-yet silent machine. All were anxious about one thing: How would the new machine unit make out in its first steps, in its trial run with a full production load?

And in front of it, the new line can expect a broad road--series production in industry and then work at plants producing cotton-like staple fiber. Of course the technical possibilities of the machine would have to be confirmed practically, and its planned capacity--40 tons of fiber per day--will have to be assimilated. This will not be an easy thing to do: Stiffer requirements are being imposed on the quality of the raw material, on the conditions of the production process and on the qualifications of the workers.

But today is a holiday, and we can understand what is going through the minds of the plant workers: The great and hard work of installation and adjustment has been completed, and the debates, doubts and searches for optimum decisions are behind. And each wants to see the result of his labor sooner, to hold in his hands that fiber with unusual properties, light like springtime down.

"The new flow line has a large number of fundamental advantages over existing staple machine units," said T. Aleynikov, chief of the production and technical division. "But the main thing is that this line will make it possible for us to achieve a qualitatively new level in production technology. It all has to do with a new extrusion method. Each separate fiber bundle is fully encapsulated, meaning that the quantity of toxic substances entering the work zone is decreased by several orders of magnitude.

"I must admit that I was puzzled at first. I expected to hear the usual comparison of technical characteristics and the typical facts and figures, but here they say that the basic and most important advantage of the new line lies in the working conditions. Though I did spend some time in the work zone of operating machine units and persuaded myself through my own experience that this was in fact so, I still thought that this was not the main advantage. However, no matter whom I talked to at the plant, it was mainly this advantage of the new line--better working conditions--that was emphasized to me."

"As far as the technical characteristics are concerned," chief process engineer S. Umnova explained, "I should note that a flow line of such productivity is unique for the moment both here and abroad, and it is no accident that specialists from many countries are showing higher interest in it."

This brief statement clearly defines the general course of our economy toward intensification of production and growth in the unit output capacity of machines and machine units. Here at the plant, one can see its concrete embodiment with the unaided eye. In terms of surface area, the new line occupies a little more room than the existing machine units, but its productivity is almost twice greater. According to tentative estimates it will release 15 workers in the principal specialties--ones awaited in other sections, it will dramatically reduce the demand for water in the production process, and it will decrease losses of raw materials.

There is another important fact: The plant did all of the installing itself. And it not only helped the adjusters and planners, but it also participated in improving the design and utilizing the accumulated experience of operating similar machine units. Though the remarks of the plant workers, their proposals and the minor improvements they suggested were not earth-shaking, in the final analysis they did significantly improve the design. A. Zelenin, the leader of a brigade of fitters from the mechanical repair shop, assistant foreman I. Lupandin, section chief M. Seleznev and many other workers and specialists of the plant proved themselves to be thoughtful and creative specialists during the installation and adjustment of the equipment.

The other side of preparing the new line for operation--the organizational side--was described to me in detail by the plant director, V. Prodan. I found that all specialists had thoroughly studied the new production process using an experimental stand at the plant. The workers underwent special technical training, and the shifts will work according to the new brigade form of labor organization and stimulation.

"The new flow line is a prototype of future plants producing cotton-like fiber in our country," Vasiliy Vasil'yevich Prodan said with conviction. "I would hope that our experience in installing and adjusting the line without interrupting production and maintaining close creative cooperation between Leningrad planners, Pskov machine builders and the operators--would be utilized by other enterprises. After all, it opens up new possibilities for developing production of a valuable raw material with improved output capacities at low outlays."

The first batch of viscose high-modulus fiber was recently obtained. Now the plant's collective faces a new important task--raising the output capacity of the highly productive machinery to its planned level faster, and providing textile workers with raw material from which to make practical and strong fabric similar to cotton.

11004
CSO: 1841/229

UKRAINIAN SSR CHEMICAL INDUSTRY: PROSPECTS FOR DEVELOPMENT ANALYZED

Kiev EKONOMIKA SOVETSKOY UKRAINY in Russian No 2, Feb 82 pp 14-18

[Article by V. Kostenko, section chief, Ukrainian SSR Gosplan]

[Text] Chemical materials and chemical production methods have always played an important role in the development of productive forces and in the satisfaction of the society's material needs. This is why chemical industry, the basis for the national economy's chemicalization, defines the country's economic potential to a significant degree. It may be said without exaggeration that no important scientific-technical, economic and social problems can be solved today without the use of chemical materials and products or chemical technology. Thus the food program requires an increase in the production and creation of new forms of mineral fertilizers and chemical plant protection resources, feed additives, preservatives, various films and other chemical materials and chemicals; the development of space requires ultrastrong materials; the problem of protecting the environment requires new chemical production processes. The degree to which we can raise labor productivity and make working conditions easier, especially for women, depends in many ways on the level of development of household chemistry.

It was precisely on the basis of this definition of the role and place occupied by the sector that the 25th and 26th CPSU congresses emphasized the need for preferential development of chemical industry and for constant improvement of its structure.

Significant successes were achieved in development of chemical industry in the 10th Five-Year Plan. Deliveries of mineral fertilizer to agriculture were more than 30 percent higher than in the previous five-year plan. Production of plastics, chemical fibers and filaments, paint and varnish products, consumer chemicals and other articles increased significantly. In terms of chemical production volume, our country now holds first place in Europe and second in the world.

The Ukrainian SSR's chemical industry, which is developing in accordance with a unified national economic plan with a consideration for both all-union interests and the need for the integrated development of the region's productive forces, is making a major contribution to raising the effectiveness of the country's social production.

The Ukraine now produces almost a fifth of the country's chemical products (by volume), about 49 percent of its sulfur, 14 percent of its caustic soda, 23 percent of its soda ash and 44 percent of its white pigments. Natural sulfur, titanium dioxide, photographic materials, synthetic dyes and other items are obtained here for countrywide use. During the five-year plan the proportion of chemical and petrochemical products in the total industrial production volume of the Ukrainian SSR increased from 5.9 percent in 1975 to 6.5 percent in 1980. During this period the sector's production of commercial goods increased by more than 30 percent.

In the last five-year plan the sector witnessed a construction program of sizeable scale, as a result of which new productive capacities were placed into operation and existing ones were expanded and rebuilt. More than 3.5 billion rubles of capital investments were assimilated, making it possible to increase fixed productive capital by almost 1.6 times in comparison with the Ninth Five-Year Plan. Among the facilities created in the 10th Five-Year Plan are large carbamide production complexes at the Gorlovka "Stirol" Production Association and in the Cherkassy and Dneprodzerzhinsk "Azot" associations, and highly productive sulfuric acid production facilities at the Sumy "Khimprom" Association, the Rozdol "Sera" Association and the Konstantinov Chemical Plant. Capacities able to extract 1 million tons of natural sulfur have been created at the Yavorov "Sera" Association. The largest facilities of the five-year plan, created on the basis of compensatory contracts having important significance to international economic ties, include the Odessa Portside Plant, an ammonium pipeline connecting Gorlovka to the Odessa Portside Plant, and a polyethylene production complex in Severodonetsk.

As was foreseen in the 10th Five-Year Plan, while an absolute increase occurred in chemical production volume, preferential development was enjoyed by those forms of production which promoted the most effective growth of social production: mineral fertilizers, plastics and chemical fibers and filaments.

Production of plastics and synthetic resins increased during this period by more than 1.8 times due to introduction of polyvinyl chloride resin and polystyrene production operations at the Dneprodzerzhinsk "Azot" Association, a polyvinyl chloride resin operation at the Pervomaysk Chemical Plant and a polyethylene operation at the Severodonetsk "Azot" Association. The output capacities of the Cherkassy and Zhitomir chemical fiber plants and the Chernigov "Khimvolokno" Association have been increased.

Much work was done to develop production of mineral fertilizers, chemical plant protection resources, feed additives and other chemicals needed by agriculture with the goal of its further chemicalization. During the five-year plan output capacities producing 4.9 million tons of mineral fertilizers and 20,500 tons of chemical plant protection resources were placed into operation; large facilities producing raw materials for mineral fertilizers--ammonium, sulfuric acid and nitric acid--began putting out their products. Capacities capable of producing 1.32 million tons of feed phosphate per year were created in the republic. Concurrently with increasing production volume, measures were implemented to upgrade the quality of mineral fertilizers and expand their assortment. In comparison with 1975, the proportion of mixed concentrated fertilizers increased in relation to the total production volume, and the amount of their useful ingredient was enlarged.

A great deal of work was done to expand and reequip enterprises of the soda and bromine subsectors. In petrochemical industry, further development was enjoyed by the output capacities of the Belaya Tserkov' Tire and Industrial Rubber Article Association, the Dnepropetrovsk "Dneproshina" Association, the Sumy Industrial Rubber Article Plant, the Kremenchug Industrial Carbon Plant and others.

Much attention was devoted in chemical industry to production of cultural, personal and household goods. Production of various consumer goods was organized at 65 enterprises (out of 85) of the Ministry of Chemical Industry by the end of the five-year plan: photographic chemicals, synthetic laundry detergents, plastic and chemical fiber articles, cosmetics and personal chemical goods--a total of over 400 different items. Enterprises of the Ministry of Chemical Industry and the Ministry of Fertilizer Production produced 665 million rubles worth of such goods in 1980.

A large quantity of major conservation measures have been implemented in both chemical and petrochemical industry.

However, evaluating what had been done in the past five-year plan, we should note that the successes might have been incomparably greater, had better use been made of the existing output capacities, and had new shops and facilities been built and assimilated more quickly.

Thus because of restrictions on phosphorus availability, a number of phosphate fertilizer and feed additive production operations had to work below peak volume. The polyethylene production complex at the Severodonetsk "Azot" Association never achieved stable operation in connection with the fact that the ethylene facility of the Lisichansk Petroleum Refinery has been slow in reaching its full output capacity. There are other examples of slow assimilation of introduced capacities as well.

A low pace of construction and delays in solving planning problems and providing equipment resulted in the fact that some soda ash, titanium dioxide and chemical fiber output capacities were never placed into operation; chemical facilities at which construction has been dragging on for a long period of time include the Sivashskoye Aniline Dye Plant, the caprolactam production operation at the Cherkassy "Azot" Association, the Pervomaysk Chemical Plant and a number of others.

The 26th CPSU Congress defined the new prospects for development of chemical industry. The great socioeconomic and technical problems facing the country in the 11th Five-Year Plan and in the future cannot be solved without significant development of chemical industry. We must strengthen and expand the sector's raw material base and raise the effectiveness of its subsectors by introducing improved equipment, highly productive catalysts, and wasteless and low-waste production processes.

During the 11th Five-Year Plan the Ukraine's chemical industry must satisfy more fully the local demand for mineral fertilizers--to support development of the agroindustrial complex, for plastics--to support machine building and construction, and consumer chemicals--for the public.

In 1981-1985 the republic is to enjoy a further increase in mineral fertilizer production capacities. Steps will be taken to raise the quality and expand the assortment of mineral fertilizers. In 1985, mineral fertilizer production is to climb to 26 million tons, in comparison units (32 percent more than in 1980). Preferential development will be experienced by production of mixed and concentrated fertilizers; their output will be increased by 1.6 times in the five-year plan. This will require introduction of output capacities producing nitroammofos at the Rozdol "Sera" Association, carbamide at the Severodonetsk "Azot" Association, and others.

Much work will have to be done to develop sulfur production, primarily at the Yavorov "Sera" Association. Geological exploratory and preparatory operations of significant volume will be performed with the purpose of organizing sulfur mining at the Zagaypol'skiy deposit in Ivano-Frankovskaya Oblast, and at the Gremnovskiy deposit in L'vovskaya Oblast.

During the current five-year plan the output capacities of distributing stations along the ammonium pipeline between Gorlovka and the Odessa Portside Plant is to be increased, and liquid ammonium storage and distributing stations are to be built in some of the agricultural rayons. This will make it possible to increase the scale of the republic's use of liquid ammonium as fertilizer. By the end of the five-year plan the proportion of concentrated and mixed fertilizers in relation to total production should increase to 82 percent.

Growth in production volume and in deliveries of concentrated and mixed fertilizers will doubtlessly promote reduction of labor outlays in agriculture and an increase in the coefficient of fertilizer use. But before this could be achieved, a large amount of work will have to be done in both chemical industry and agriculture during the next 5-10 years: The tendency of fertilizers to cake will have to be corrected, a uniform granule size will have to be achieved, the network of manure mixing facilities and storage sites will have to be widened, and the volume of unpackaged fertilizer shipments will have to be increased significantly.

The use of fertilizer will become effective only in the event that an optimum relationship is reached between the use of fertilizers and chemical plant protection resources. New operations producing chemical plant protection resources--hexachlorobutadiene and (polikhom) in particular--are to be built during the five-year plan, and existing operations are to be expanded. A significant proportion of the chemical plant protection resources will be supplied to the Ukraine from other republics and CEMA countries.

The high rate of development of plastic and synthetic resin production operations will continue into the 11th Five-Year Plan. By 1985, production of these articles is to increase by almost 1.6 times. New output capacities are to be placed into operation at the Cherkassy "Azot" Association, at the Rubezhnoye "Krasitel'" Association, at the Borislav Chemical Plant and elsewhere. There are plans to expand production of chemicals imparting different properties to plastics and increasing the strength and life of articles made from them.

Efforts to develop production of chemical fibers will continue. Their output will be increased by 20 percent in 1985; this will be coupled by an improvement in the production structure and an increase in the strength and elasticity of synthetic filaments intended for industrial purposes. It is with this purpose that an operation producing cord fabric to be used in the manufacture of oversized tires will be organized at the Chernigov "Khimvolokno" Association, and that new capacities producing modified and textured filaments will be placed into operation at the Zhitomir Chemical Fiber Plant. There are plans for producing up to 30,000 tons of such filaments in 1985. The capron production operation of the Kiev "Khimvolokno" Association is to be rebuilt and converted to production of braid for carpet.

To save on cotton, a viscose surgical cotton production operation will be created at the Sokal' Chemical Fiber Plant.

There are plans for a major effort to develop capacities producing dyes and auxiliary substances for textile industry. In particular the output capacities of the Sivashskoye Aniline Dye Plant are to be assimilated beginning in 1984, and new output capacities will be built and placed into operation at the Ivano-Frankovsk Precision Organic Synthesis Plant. Reconstruction and reequipment of many shops of the Rubezhnoye "Krasitel'" Association will begin. Further reconstruction and expansion of the Lisichansk and Krymsk soda plants and introduction of a major caustic soda production operation at the Kaluga "Khlorvinil" Association will promote further growth in production of soda products.

The 11th Five-Year Plan turns special attention to developing consumer goods production. Completion of this task will be promoted by construction and commissioning of facilities such as the household chemicals shop at the Rubezhnoye "Krasitel'" Association, a paint and varnish shop at the Sumy "Khimprom" Association and at th Donetsk Chemical Plant, a plastic articles plant at the Gorlovka "Stirol" Association and a synthetic laundry detergent production operation at the Vinnitsa Chemical Plant. Much work will be done to expand production of chemical products at the Shostka "Svema" Association and at a number of others.

Production is to be significantly expanded at the republic's petrochemical industry enterprises in 1981-1985. There are plans for expanding output capacities of the Belaya Tserkov' Tire and Industrial Rubber Articles Association and at the Sumy Industrial Rubber Articles Plant, and to place the Gorlovka Rubber Footwear Plant, specialized in the production of special footwear, into operation. Construction of Tire Plant No 2 is beginning in Belaya Tserkov'. Its first output capacities are to be placed into operation in 1985-1986.

Reducing the proportion of materials and energy required by chemical production is an important problem associated with raising the effectiveness of the work of the sector and of each enterprise. This reduction is to be achieved by improving production processes, decreasing the relative outlays of energy and thermal power, intermediate products and raw materials, by subjecting materials to deeper and fuller processing and by making maximum use of secondary resources.

Production increased at all existing enterprises during the 10th Five-Year Plan practically without increasing the number of workers--by raising labor productivity. Production will be increased during the 11th Five-Year Plan in the same way. This will be possible owing to the fastest possible assimilation of new production processes and highly productive equipment, automation of production, mechanization of auxiliary processes and improvement of the work of repair services.

Solving the problems of protecting the environment from pollution is a prerequisite of the development of enterprises in chemical and petrochemical industry. This is why significant capital outlays will be allocated in the current five-year plan to environmental protection, including to introduction of low-waste and wasteless production processes.

Fulfillment of the tasks facing the sector requires effective use of all forms of resources, an active search for reserves, and selfless labor by all workers of the industrial enterprises and the scientific research and planning organizations. Only by mobilizing all efforts of the laborers in the sector can we ensure growth of the sector's technical level, improvement of the effectiveness and quality of its work and successful fulfillment of the tasks posed to chemical industry by the 26th CPSU Congress.

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11004
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CHEMICAL INDUSTRY PRODUCTION UP

Moscow SOTSIALISTICHESKAYA INDUSTRIYA in Russian 30 May 82 p 1

[Text] There is good reason for calling chemistry multifaceted. Synthetic materials are enjoying increasingly broader use in all spheres of the economy and in the daily lives of people. Polymers with prescribed properties, chemical fibers and filaments, synthetic rubber, washing agents, dyes and medicinal preparations--all of these and many other necessary things are provided to us by the most important sector of modern industry. Chemicalization of the national economy is opening up broad possibilities for raising the effectiveness of production and hastening the rate of scientific-technical progress.

Chemistry is playing a special role in intensification of agriculture. Responding with action to the decisions of the May Plenum of the CPSU Central Committee, laborers of mineral fertilizer industry are increasing production of "fertility vitamins" and plant protection resources, and they are attempting to make an honorable contribution to implementing the USSR's Food Program.

A competition for an honorable welcome to the 60th anniversary of the USSR's formation and for predeadline fulfillment of the quotas of the five-year plan's second year has assumed broad scope at enterprises of chemical industries these days. Chemical, petroleum refining, petrochemical and microbiological industry surpassed the planned quantity of products provided to the country by tens of millions of rubles. Hundreds of brigade, section and shop collectives and many thousands of laborers reported completion of the first semiannual program at the eve of their professional holiday.

11004
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OIL MINISTER SUGGESTS DEEPER REFINING AS ECONOMIZATION MEASURE

Moscow SOTSIALISTICHESKAYA INDUSTRIYA in Russian 30 May 82 p 2

[Article by USSR Minister of Petroleum Refining and Petrochemical Industry V. Fedorov: "Oil: Don't Burn It, Refine It"]

[Excerpts] As in previous years, the country's petroleum refining and petrochemical industry is developing stably and at a high rate in the present five-year plan, in accordance with decisions of the 26th CPSU Congress. The countenance of the sector is defined today by modern production systems capable of high unit output, by progressive, highly productive equipment and by a broad assortment of valuable products and basic raw chemicals obtained from petroleum. The positive changes occurring in the production structure have revealed themselves more definitely. Preferential growth is now ensured for production of high octane gasolines, low sulfur diesel fuels, lubricating oils with additives, new forms of synthetic rubber replacing natural rubber, and longer-life radial motor vehicle tires. A noticeable step forward has been made in raising production effectiveness and improving work quality in all units of the economic mechanism.

Decisions of the party Central Committee plenum held this week and the deeply grounded report given by CPSU Central Committee General Secretary Comrade L. I. Brezhnev, which defines the basic paths of implementing the Food Program, evoked a new upsurge in the creative efforts of the labor collectives. The party's appeal to make sharp improvement of the economy's agrarian sector the most important task of all the people has enjoyed avid support at petroleum refining and petrochemical enterprises producing the most diverse products for farmers.

According to the results of the first 4 months and of the first half of May, our ministry's enterprises have fulfilled their pledges associated with delivering products to agriculture. The plants and associations are now searching for new reserves for increasing the output of such products with the purpose of making the sector's contribution to fulfillment of the Food Program even more substantial.

While noting what we have done, we must at the same time take notice of the serious shortcomings in the work of our industry, especially in regard to capital construction, introduction of the achievements of science and technology and improvement of the style and methods of control. Not all enterprises are fulfilling their planned quotas and their contracts for delivering finished products. The fastest possible solution of these problems will make it possible to improve the use of the sector's enormous productive potential.

The most important task of both the current five-year plan and of the future continues to be that of raising the effectiveness with which petroleum is used. The urgency of this problem is elicited, on the one hand, by a significant increase in public outlays on petroleum extraction connected with a shift in the location of the main extracting base into remote regions of Siberia and the North, and on the other hand by swift growth in the national economy's demand for motor fuels, lubricants and other petroleum products. Today, petroleum is also an irreplaceable source of raw materials used in the production of plastics, rubber, synthetic fibers, washing agents and many, many other chemical and petrochemical products.

The residue from primary distillation--fuel oil--may be used successfully as an additional raw material in the production of a broad range of motor fuels and other scarce petroleum products. By subjecting it to secondary refining we can reduce consumption of petroleum to produce every ton of motor fuels by more than a time and a half. Given today's scale of production, this would be equivalent to a real savings of tens of millions of tons of "black gold."

Today's Soviet industry enjoys a sufficient scientific-technical foundation from which to reorient the sector toward intensive use of crude petroleum based on its deeper refining. The first steps in this direction have already been made. Complex combined "GK-3" systems, which have made it possible to increase the yield of high quality light petroleum products from West Siberian petroleum to 70 percent, are now operating at the plants in Angarsk and Kremenchug. Catalytic systems are successfully subjecting petroleum to deep refining at Omsk, Ufa and Ryazan'.

The positive results achieved in operating these facilities were the basis for developing even larger second-generation systems, in which primary and secondary refining have been combined into a single complex. Such a system is essentially represented by an independent plant. The advantage of such giants is that one complex of this sort can produce the entire assortment of petroleum products and that the need for erecting separate facilities intended for a narrow assortment of goods is eliminated.

We plan to build five such high capacity systems in this five-year plan. Two of them will go into operation very soon--the ones at the Moscow and Pavlodar petroleum refineries.

A long-range program for raising the effectiveness with which crude petroleum is used in the country's principal petroleum refining centers has been developed. For example an integrated program for fundamentally rebuilding the Baku refineries foreseeing a significant increase in the depth of petroleum refining has been approved in the Azerbaijan SSR. Similar decisions have been made in the Kazakh SSR, the Bashkir ASSR and other regions. Implementation of these measures will make it possible to obtain an additional 10 million rubles worth of motor fuels, raw chemicals and other valuable products from the same quantity of crude petroleum by the end of the five-year plan.

The scientific research and planning organizations of the USSR Ministry of Petroleum Refining and Petrochemical Industry and the Ministry of Chemical and Petroleum Machine Building have done a great deal to create highly productive equipment and effective processes for petroleum refining. But sometimes the work is not carried out at the required level, and new equipment often fails to meet modern requirements of economy and reliability, making it difficult to introduce progressive technology. The contribution made to the solution of these problems by sector and academy institutes must be significantly enlarged, and creative cooperation between scientific research and planning organizations and the industrial enterprises must be made closer and more productive.

Implementation of our plans for sensible use of crude petroleum will depend to a decisive extent also on what quantity of heavy petroleum residues we will be able to subject to further refining. We must develop a specific-purpose integrated program foreseeing successive and consistent reduction of the proportion of fuel oil used as fuel and its substitution, where possible, by coal, gas and combustible shale.

Thus far, the plans for production and capital investments have been written and the other base indicators have been developed for two inseparably associated subsectors--petroleum refining and petrochemistry--by two sector divisions of the USSR Gosplan: the petroleum and gas industry division and the chemical industry division. This situation produces various inconsistencies in planning and violations of the proportions existing within the sector. It seems to me, therefore, that it would be suitable to create, within the structure of Gosplan, an independent division of petroleum refining and petrochemical industry. This would promote clearer coordination in efforts to complete the task proposed to the sector by the 26th party congress.

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CURRENT STATUS OF PROCESSES AND EQUIPMENT IN CHEMICAL TECHNOLOGY

Tashkent UZBEKSKIY KHIMICHESKIY ZHURNAL in Russian No 1, Jan-Feb 82
(manuscript received 2 Jun 81) pp 50-56

RIZAYEV, N. U., Institute of Textile and Light Industry

[Abstract] This is a review of developments related to automatic control systems in chemical technology and the transition from experimental to production applications of new advances, stressing the need for articulating accurate mathematical models that will contribute to efficient computer control of operations. Operations mentioned include transmission of liquids and gases, pulsation methods and the use of mechanical and magnetic fields, plasma chemistry installations, radiation chemical processes involving nuclear radiation, ion exchange processes in producing acids, salts and highly pure substances, and particularly ion exchange synthesis in dynamic conditions, for which a coefficient of mass exchange is developed. This theory was tested in a weak polar medium of alcohol and water for concentrations of H^+ ions. Results indicated that increased concentrations of the organic solvent, which decreased polarity, brought a divergence between theoretical and experimental values, for the mechanism of the process changed into common adsorption of reacting substances. Other ion exchange processes involved regenerating engine oil, where the preferred process was determined to involve engine oil rather than benzene solutions that required expensive filtration. Theoretical methods using LaGrange multiplicands, linear programming, non-linear optimization and variational principles were confirmed by experiments. Such a task was presented by determination of resistance in mass transfer to be used in complex chemical production systems. Figures 3; references 3 (Russian).
[208-12131]

COAL GASIFICATION

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SYNTHETIC LIQUID FUELS: PAST, PRESENT, FUTURE

Moscow VESTNIK AKADEMII NAUK SSSR in Russian No 1, Jan 82 pp 123-133

LOKTEV, S. M., doctor of chemical sciences

[Abstract] The author summarizes efforts to produce synthetic fuels that began early in this century with attempts to convert coal, oil shale and wood into liquid hydrocarbons. Early practical results came in the Ruhr in 1912-15, and later in Nazi Germany. The first Soviet efforts were undertaken by the State Institute of High Pressure Technology in Leningrad and the All-Union Scientific Research Institute of Liquid Fuels and Gas in Moscow, in the mid-1930s. Wartime needs brought new urgency to synthetic fuel production, with the main efforts directed toward hydrogenation. The Fischer-Tropsche synthesis from CO and H_2 at 1 at. produced 60% benzine of about 50 octane, 30% diesel fuel and 10% paraffin. Such products enabled Germany to pursue its warfare, despite its lack of domestic crude oil. After the war some synthetic fuel production continued, but the real interest followed the oil shortages and the realization of dwindling world supplies in 1973. With greatly increased prices, synthetic fuel production became economically attractive. In the USSR, the Energy Institute imeni G. M. Krzhizhanovsky has worked on experimental production of a semi-coking-high-speed pyrolysis process, to be used to process Kansko-Achinsk brown coal into annual production of 300,000 tons of semi-coke, 120 million cubic meters of gas for electric power stations, and 100,000 tons of synthetic resin. Hydrogenation has been improved to accomplish initial gas liquefication at the Institute of Combustible Minerals. The Mobil Process has been developed to replace the Fischer-Tropsche one to produce high octane benzine by dehydration from coal using zeolitic catalysts of methanol. Costs of synthetic fuels remain high, but efforts to improve that factor continue in the USSR and elsewhere.
[206-12131]

FERTILIZERS

STATUS OF CHILISAY PHOSPHORITE MINE

Alma-Ata NARODNOYE KHOZYAYSTVO KAZAKHSTANA in Russian No 9, Sep 81 pp 51-53

[Article by V. Rogozhin: "Chilisay Today and Tomorrow"]

[Excerpts] The Aktyubinsk phosphorite basin has long been known. It was discovered back at the end of the last century by a Russian geologist , Academician F. Yu. Levinson-Lessing. Though not entirely successful, the first attempt at estimating the phosphorite reserves was made 15 years later.

Aktyubinsk phosphorites were subjected to further rather productive study in the 1930s. The Kandagach deposit was explored, and the Koktyubinskoye and Talaspayskoye deposits were studied and evaluated. The Zolotonosha, Bogdanovka and Novoukrainka deposits and the Tamdinskiy and Terek-Say sites were discovered north of Kandagach (presently the city of Oktyabr'sk).

At the same time a prospecting party from the fertilizer institute calculated the reserves of the Bogdanovka and Novoukrainka deposits under the guidance of B. M. Ginmel'farb. An experimental plant of the fertilizer institute conducted research on concentrating Bogdanovka and Kandagach phosphorites. The positive results of this research served as the basis for building a mineral fertilizer production combine in Aktyubinskaya Oblast.

It must be admitted that the present Chemical Plant imeni S. M. Kirov in the city of Alga was not located at the best phosphorite deposit. Requiring concentration, the poor ore made mineral fertilizer production unprofitable, and soon the former Aktyubinsk Chemical Combine was converted to production of phosphate fertilizers using a richer raw material--apatite from Khibinsk.

The question of utilizing the Aktyubinsk basin was raised again in the 1960s. On one hand it was one of the country's most promising suppliers of phosphate fertilizers, while on the other hand its utilization would promote sensible distribution of extracting and processing capacities.

Creation of a mine and a phosphorus fertilizer plant was planned at the Bogdanovka deposit in 1959. In this connection Aktyubinsk geologists did a great deal of prospecting and sampling. New prospecting methods and improved analysis methods made it possible to reveal a number of new deposits. Geologists discovered the Chilisay deposit, and then the Verkhne-Karagandinskoye, Karaganda, Shibayevskoye, Luga, Temreyskoye and Shulakskoye deposits. This completed the initial evaluation of the centralpart of the Aktyubinsk basin.

The Chilisay deposit, the total reserves of which were estimated at 1 billion tons, was recognized to be the most promising. Ore containing phosphorus anhydride exists as a solid layer, not very deeply buried. This encouraged Aktyubinsk geologists to ask the USSR Minister of Geology to accelerate efforts to evaluate the Chilisay deposit. A suggestion was made to locate a mine not at the Bogdanovka deposit, where prospecting revealed only 80 million tons of phosphorites, but rather at the Chilisay deposit. In 1972 the USSR Ministry of Chemical Industry adopted a decision calling for priority development of the Chilisay deposit.

A year later the field work was finished. Scientific research on concentrating the ore from the Chilisay deposit, improving the production processes and making its extraction economically more effective was conducted concurrently. It was carried out by scientists of a number of all-union and republic scientific research institutes. The results showedthat the local raw materials should be used extensively in the production of mixed fertilizers.

Geologists of western Kazakhstan discovered a total of 40 deposits with total predicted reserves of 3 billion tons. This put the Aktyubinsk phosphorus basin in third place in the country. On 13 August 1975 a traveling session of the USSR Council of Ministers State Reserves Commission confirmed the reserves of the Chilisay deposit at 1,577,000,000 tons, of which 1,150,000,000 tons were balance reserves, to include 658,000,000 tons in the industrial category.

Such was the start. A mining and concentrating complex with an annual productivity of 1.4 million tons of phosphorus concentrate per year has been under construction at the Chilisay deposit since 1974. The first part of the complex's first generation, which is to have an output of 700,000 tons, is to go into operation in 1985, and the entire first generation will be working by 1988. Then the productive capacities are to be doubled, raising them to 2.8 million tons of concentrate per year. The balance reserves of phosphorite ore should keep the enterprise operating at this output capacity for 100 years.

The enterprise will include quarries and a complex of processing, subsidiary, auxiliary and maintenance shops. The deposit is to be worked as an open pit by a combined system.

Mining operations will be performed with walking excavators, scrapers, draglines and other excavating and earth-moving equipment. Blending depots have been foreseen at each quarry for the purposes of averaging out the qualities of the ore in terms of harmful and useful components. Ore will be delivered to these depots by BelAZ-540A dump trucks, and from them it will be carried to the receiving hoppers of the concentrating factory by rail. The phosphorite ore processing flow chart foresees two basic processes--washing, together with separation of washed concentrates, and flotation, which can raise the concentration of phosphorus pentoxide in the concentrate to 24 percent.

Representatives of four contracting and 25 subcontracting organizations are building the mine. The general contractor is the recently created "Chilisaytyazhstroy" trust. About 250 plants and 20 of the Soviet Union's planning organizations are supplying equipment and documents to Chilisay.

These plants include giants such as the Kama Motor Vehicle Plant, the Novo-Kramatorsk Heavy Machine Building Plant and enterprises of Moscow, Novosibirsk, Minsk, Irkutsk, Tashkent, Alma-Ata and many other cities.

The Moscow "Gosgorkhimproyekt" Institute is planning the entire mine complex with the assistance of subcontracting organizations. Documents to support construction of approach routes are being prepared by the "PromtransNIIproyekt" in Novokuznetsk, Odessa's "Giprosvyaz'" is taking care of communications, Alma-Ata's "Energosel' proyekt" is planning the boiler rooms, Aktyubinsk's "Kazzapsel'proyekt" is planning the miners' city, and Alma-Ata's "Kazgiprotorg" is developing the department of workers' supply, construction of which will be completed this year.

The All-Union "Soyuzgorkhimprom" Association, which represents the mine's board at the construction site, is dealing with all problems associated with construction at Chilisay.

Many things have slowed construction down, but the main problems were absence of a local construction industry base, lack of housing and, as a consequence, a shortage of workers, especially skilled ones.

The lost ground of the first years is still having an impact today. During the time that the mine has been under construction, the total amount of construction and installation jobs completed has been a little more than 46 million rubles, while the plan foresaw assimilation of a time and a half more--72.6 million rubles.

But now the "Chilisaytyazhstroy" trust and the construction industry base have grown stronger, and commercial concrete and asphalt-concrete plants and a complex of repair facilities of the construction mechanization administration have been built. Fully equipped housing has attracted qualified specialists to the construction site. The turnover of young personnel has decreased significantly.

The plan for assimilation of capital investments has been completed ahead of schedule in the last 2 years. Construction is growing in scope and rate. Last year for example, 16.2 million rubles worth of general contracting jobs had to be assimilated. The quota was surpassed by 1,563,000 rubles.

The rate of commissioning of fixed capital has grown significantly. Fixed productive capital worth 873,000 rubles was introduced in 1979. Last year this number increased by almost four times to 3,321,000 rubles. The proportion of unfinished construction has decreased significantly. Now the mine's board of directors and the builders of the mining enterprise are concentrating all of their attention on completing the construction starts of the 11th Five-Year Plan and on placing them into operation on schedule.

A microdistrict reserved for Chilisay's builders in the southwest quarter of the city of Oktyabr'sk is growing quickly. Multistory residential buildings have risen in a place where there was nothing but barren steppe until quite recently. The apartments now have hot water, communication lines have been laid, and there are now stores and a nursery school.

Next to it is a microdistrict of single-story buildings--one- and two-apartment houses with private plots and yard buildings. It has its own stores and nursery school. Regular bus service connects it to the city.

The Chilisay phosphorite mine presently consists of an experimental concentrating factory, a mining section, a transportation shop, a nonstandard equipment section, a power engineering service, boiler rooms servicing the industrial facilities and the microdistrict, a substation, a section dealing with monitoring and measuring instruments and automatic equipment, and a municipal and housing services office.

Construction is growing and expanding, and the creativity of the miners is increasing. Last year the economic impact from introducing new ideas was 152,000 rubles. The turnover among highly qualified specialists has decreased in all units of the experimental concentrating factory and the mining and motor transportation shops. Labor and production discipline has improved.

One of the most important components of the mine is the experimental concentrating factory. It was placed into operation in December 1977. In 1978 it produced its first lot of phosphorus concentrate, containing 7.5 percent phosphorus pentoxide. This was an achievement.

Ore from the Chilisay deposit is dominated by sandy phosphorite nodules. The quality of phosphorite meal produced from this raw material did not satisfy the requirements because the ore concentrating procedures had not yet been worked out. Only an experimental concentrating factor could help solve the problem. The young collective managed to solve it.

The ore concentrators successfully completed the program for 5 months of the first half-year of the 11th Five-Year Plan. The washed concentrate production plan was 102.7 percent completed, the sales plan was exceeded by 1.3 percent, and labor productivity grew by 2.6 percent.

The factory also performs another function. It has become a training school for personnel for the production and repair and technical services. Here they learn to use the machinery and apparatus employed at similar mining and concentrating enterprises.

But this is all just the beginning. The workers of Chilisay still face many problems.

An optimum process for working the ore in winter must be found, and solutions must be found to water supply and a number of other problems. They must be solved right now. Time does not wait. Agriculture's demand for mineral fertilizers is growing with every year. Chilisay knows and remembers this. The builders, planners and miners are all working together to get the mine working sooner.

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DISORGANIZATION SLOWS CONSTRUCTION OF NOVO-SOLIKAMSK POTASSIUM PLANT

Moscow SOTSIALISTICHESKAYA INDUSTRIYA in Russian 15 May 82 p 1

[Article by ZVEZDA Correspondent I. Vikhnin: "From Report to Report"]

> [Text] Erection of a potassium giant--the Novo-Solikamsk plant, which will produce up to 4 million tons of fertilizer salts per year--is the main task of the collective of "Glavzapaduralstroy" Trust No 8 in the present five-year plan. The first generation of the enterprise, which will have an output capacity of 900,000 tons of fertilizers, is to go into operation this very year. Clear organization of competition and coordination in the actions of builders and installers are more important today than ever before. How are things really going at the construction site?

The lunch break had ended 10 minutes before, but we missed the installers at their workplace. We found them in the brigade break car. This was more than strange. They, after all, the installers from "Uralstal'konstruktsiya" trust are the perpetual targets of unkind words from the builders for being behind schedule.

Yes, brigade leader L. Sedel'nikov agreed, they have not been able to keep up with the schedule, and it was about time they started working with full energy. But it was the builders of Trust No 8 that were at fault, since by not preparing the foundations for the metallic structures, they were keeping things from getting started.

"It's such a waste of time here," confirmed V. Kondrakov, the deputy chief of the plant's capital construction division.

"That's exactly what it is, a waste of time. It's so crowded here that installers and builders can't work together at the same time. People working on associated jobs should be placed in different shifts. But no one seems to want to solve this simple problem."

We went next door to the building atop shaft No 2. Half an hour had already passed after lunch. But the carpenters and concrete layers had not yet gone to work. Foreman A. Abdulin of Construction and Installation Trust No 5 did not even try to debate the fact: Things were going badly. They were already so far behind schedule that the brigade had to surpass the norm by a minimum of 20 percent.

The mining complex of the Novo-Solikamsk Potassium Plant was supposed to have gone into operation last year. The trust's main objective was to complete all of the complex's 30 facilities, including the mine shafts. The builders were unable to handle the planned work volume. Nor had things improved in the first quarter of the present year. In 3 months 56 percent of the planned quota had been completed. Shaft No 2 had already been dug long ago. It was accepted by the workers' commission. And it is not operating yet simply because the trust's subdivisions are unable to complete construction of the above-ground structures.

Clearly, poor work organization is a hindrance to pledge fulfillment. I leafed through resolutions published by operational conferences conducted at the construction project's headquarters by trust director N. Ivanov. Categorical prescriptions adopted by the chiefs of the trust's subdivisions--"completing..., preparing for installation..., resolving the issue..."--kept reappearing from one conference report to the next.

"True," agreed G. Polyakin, the trust's party committee secretary, "some subdivision executives are being outright irresponsible...."

"What are you doing to influence them?"

"We criticize them at the conferences and in our high-volume newspaper."

Criticism is, without a doubt, a strong tool. But power must also be used against those who do not listen, and who do not make the proper conclusions.

There are examples of a totally different approach to the work here as well, at the Novo-Solikamsk construction site. Take as an example the collective of the Bereznikov Mine Construction Administration. When miners receive a mineshaft from it, it is usually totally ready to go. And it is not until everything is completed that the miners begin their own efforts in the mine. But this was not the way things went at this construction site. Realizing that their associates were hopelessly bogged down in their own operations, the mine builders decided not to wait. Within a few weeks they dug out the ventilation connector joining shafts No 1 and No 3, and they laid about a thousand meters of drifts. Owing to this the mining operations were started immediately after shaft No 3 was completed. The time gain was 3 months.

Specialists of the "Uralkhimmontazh" trust found an original way to speed the work up in the main building. Without waiting for the foundations, the installers began installing flotation machines on temporary supports. And they are doing all this with high proficiency, gradually making up lost time not of their doing. In precisely the same way, without waiting for construction to be fully completed, they began installing the straight sections of the pipelines.

Comparing the work of associates and of the general contractor, one comes to the conclusion that it would be nice for the latter to borrow from the experience of its subcontractors in providing engineering and organizational support to the competition.

11004
CSO: 1841/229

LACK OF RAIL CARS BLAMED FOR DETERIORATION OF STORED CARBAMIDE

Moscow SOTSIALISTICHESKAYA INDUSTRIYA in Russian 16 May 82 p 2

[Article by V. Yapparov, senior instrument controller, member, Salavat City CPSU Committee: "To the Warehouse Rather Than the Field"]

[Text] Our carbamide plant, which is within the composition of the "Salvatnefteorgsintez" Production Association, is behind by 47,000 tons in its deliveries of mineral fertilizers to consumers. It is extremely important to introduce carbamide into the soil in spring, and later on as well, during top-dressing of crops. One can understand the impatience with which our products are awaited by grain farmers of the Kirghiz SSR, Kazakhstan and Volgogradskaya, Rostovskaya and other oblasts of the country, to which we were unable to deliver them on time.

Could it be that this failure is just bad luck? It is not, and that is where the problem lies. Our association, which added large capacities producing mineral fertilizers a few years ago, has long been having difficulties in unloading its products. Some of the consumers have even stopped troubling the enterprise with telegrams and letters: They know that nothing would come of it anyway. The plant's planning division offered this figure: Last year we received 5,631 rail cars less than we should have. And this year in the first quarter we are more than a thousand rail cars short.

Given such a situation, our work swings back and forth from a dead standstill to a feverish effort to catch up. I recall a time when our shift had just started work, and we were immediately ordered to slow the machines down and load the carbamide on trucks that would carry it to one of the free storage sites. The carbamide lingered there for a long time in paper sacks, beneath a canopy offering no shelter from rain and wind. Some of the carbamide got wet, and the sacks disintegrated. In the end, the quality of the some of the carbamide fell below the state standard.

Whenever fertilizer cannot be delivered promptly, it is supposed to be stored in warehouses. But let's take a look at what happens there. In one of them, the largest, more than 40,000 tons of carbamide are dumped in a heap, even though the planned capacity of the warehouse is half less. Here, the fertilizer is piled in white mounds to the very ceiling, and somewhere up there a tractor crawls about leveling out these mountains. They managed to squeeze it in up there with a crane, after first dismantling the roof.

Now this warehouse is full to the brim with fertilizers. From here, the fertilizer is dispatched at a rate of a teaspoon per hour. Before you know it, a corner that was left empty is filled up in another 2 or 3 days. We were able to unload the warehouse somewhat by using our own resources--we began sending the products to some rayons of the Bashkir and Tatar ASSR in trucks. Sometimes we use so many trucks that the queue reaches a length of an entire kilometer. Fertilizer dispatched in this fashion for great distances comes out very expensive.

The mountains of highly valuable "field vitamins" become so compressed by their own weight that they transform into stony chunks which have to broken up with pneumatic hammers or other available means. Such storage clearly worsens the quality of the fertilizer. In other warehouses, carbamide packed in sacks also hardens because the sacks reach a height of 20 meters. Even in this case the granules become monolithic. It is difficult to estimate how many additional concerns and outlays this means for the consumers.

The Kuybyshevsk railroad and its Bashkir department, which services us, is often reproached quite validly for the fact that few rail cars are allocated for fertilizer. We know that the railroaders do not have it easy. We should not only sympathize with them, but we should also help them. Our association found a way to create an entire repair section at the railroad shop, where broken-down, dilapidated rail cars are not only returned to a respectable appearance but are also dried out with the help of a powerful system installed there. But the anticipated good times never came about. Interruptions in rail car delivery had been the chief problem of production, and so it remains. For example we idled away 118 hours in March due to a shortage of rail cars, and even more in April.

We have every right to say to the railroaders that their cars often stand loaded longer than normal. And this is no time for excuses; they must simply improve labor organization and monitor the work of their machinery more strictly.

Another thing that should be kept in mind is that our plant is now working at an easy pace. The neighboring production operation, which furnishes us with the ammonium we need to produce carbamide, is undergoing reconstruction, and therefore we are experiencing interruptions in raw material deliveries. But even in this situation, much fertilizer is languishing in the warehouses. What will happen when our neighbors finish their reconstruction and the production of carbamide increases?

I think that the "Salavatnefteorgsintez" Association and the Kuybyshev railroad must get together to solve this pressing problem. Time does not wait, after all: It is now, in these springtime days, that our fertilizer is needed so much by rural laborers.

11004
CSO: 1841/229

MINERAL FERTILIZER DELIVERIES FALL BEHIND

Moscow SOTSIALISTICHESKAYA INDUSTRIYA in Russian 23 May 82 p 2

[Article by Ye. Leont'yeva: "Duty to the Field"]

[Text] A year and a half have passed since the new Ministry of Mineral Fertilizer Production was created. The very fact of its creation attests to the great significance attached to this sector, the goal of which is to raise the fertility of the fields, orchards and meadows and to increase the return from each hectare of soil. Today, during the spring field operations, at the time when the land is being seeded for the future crop, is the very time to see how successful the first steps of the new ministry were, and determine if it has become a dependable support to farming.

Fertilizers pass through the hands of "Soyuzsel'khozkhimiya" on their way to the countryside. It is a hard thing to speak with the deputy chairman of this association, A. Borisenko. He barely has enough time to answer the insistent intercity phone calls. The requests are all the same: "Help!" The replies are just as monotonous: "There aren't any reserves."

Perhaps little more need be said. A. Borisenko pushed a summary of the first quarter over to me across his desk. Out of 42 enterprises producing nitrogen fertilizers, 15 failed their delivery plans. This means 112,000 tons of product, enough to cause the kolkhozes and sovkhozes to sound the alarm. Out of 29 enterprises supplying phosphorus fertilizers, 9 failed to make it--they fell short by 22,000 tons. Out of nine potassium plants, six failed their delivery plan, meaning in turn that the grain farmers were short 188,000 tons of fertilizer.

The Rustavi Chemical Plant placed Azerbaijani and Georgian farm hands in a difficult position. The Tol'yatti Nitrogen Plant, the Berezniki Nitrogen Fertilizer Plant and the Novgorod "Azot" Association did little to help workers of the nonchernozem zone. On the whole the delivery plan for the first quarter was only 98.3 percent completed. And if we consider that last year's plan was only 94.1 percent completed, it becomes obvious that the debt is growing. And although the indicators improved in 4 months, it will still be difficult to catch up.

At the same time the sector does have enterprises that are successfully fulfilling and surpassing their pledges to the farmers. They include the Voskresensk "Minudobreniya" Association, the Almalyk and Gomel' chemical plants, the "Beloruskaliy" Association, the Novomoskovsk and Shchekino "Azot" associations and the Cherepovets

"Ammofos" Association. The Rovno "Azot" Association and the Uvarovo and Samarkand chemical plants, which were among the laggards for several years in succession, have started working much better this year. The sector's headquarters helped them with equipment, it sent teams of specialists to debug the production processes, and their leadership was fortified.

But as we can see, the successes of the leading collectives could not compensate for the overall shortfall. Explaining its causes, the chemists place the blame mainly on a shortage of rail cars. Yes, once again the railroaders are letting the fertilizer suppliers down. As an example hundreds of thousands of tons of fertilizers are idling undelivered in the "Uralkaliy" Association.

But the sector also has enough shortcomings of its own. They include frequent stoppages of large machine units owing to a low level of maintenance and violations of production discipline. As a rule the organization of repairs is weak, and their quality is low.

The shortage of fertilizers is aggravated by frequent violations of the state standards. Quality control specialists of "Soyuzsel'khozkhimiya" note a decrease in the concentration of the main ingredient of the fertilizers, and higher moisture content and acidity, which cause caking of the fertilizers, transformation of the free-flowing product into monolithic chunks. Violation of the standards, the specialists feel, may raise the acid content of the soil, which is totally undesirable in relation to many crops.

Especially many complaints have been made in this regard about products from the Rustavi Chemical Plant. Several times "Soyuzsel'khozkhimiya" asked the Ministry of Mineral Fertilizer Production to publish a directive halting the production and transportation of chemical products deviating from the standards. But unfortunately steps have not yet been taken. Poor quality fertilizers continue to reach the countryside.

The Sumgait superphosphate and Balakovo chemical plants are systematically violating the transportation rules. The fact that poor quality fertilizers are often shipped is bad enough, but to make matters worse, the rail cars travel underloaded. In Balakovo, for example, 120 out of 127 weighed rail cars were found to be underloaded.

It stands to reason that shipment discipline must be observed. But it is no less important to use what has already been produced with the greatest effectiveness. "Soyuzsel'khozkhimiya" organs are especially remiss in this regard.

The problem is that the fertilizers far from always pay for themselves in high yields, and the predictions of the scientists, which are based on scientifically grounded fertilizing norms, are often proven untrue. Workers of the agrochemical service must ask themselves these questions today, now that the food program is being drawn up: Why does the effectiveness of fertilizers used with sugar beets, potatoes and other vegetables continue to be chronically low? Why are the yields of cereal crops growing so slowly in as economical a rayon as Severo-Zapadnyy for example, even though fertilizer use has been increased here by almost a factor of two?

According to data of the Scientific Research Institute of Fertilizers and Insectofungicides the most serious cause of low fertilizer effectiveness is the far from perfect level of agrochemical services to the countryside. At the moment the kolkhozes and sovkhozes have only 50 percent of the standard fertilizer warehouses they need. At 500 unloading stations in the Russian Federation fertilizer is dumped right at the sidings. The mechanization level of fertilizer application is low, and fertilizer mixing is poorly organized.

Incidentally, fertilizer mixing and optimum quantitative and qualitative selection of fertilizers for each farm have extremely important significance. At the moment this problem is being solved mainly by producing mixed fertilizers. But the nutrients required by a particular field do not remain constant; they change from year to year. The mixtures must be made locally, and "Soyuzsel'khozkhimiya" subdivisions are not prepared for this sort of work.

Scientists also note that the distribution of fertilizers, especially scarce phosphate fertilizers, between the republics, oblasts and rayons is other than optimum Take at least Moscow Oblast. The total dosage of fertilizers introduced here in two five-year plans should have been more than enough to raise the status of all soil to optimum in terms of phosphorus content. But agrochemical surveys show that almost half of the farm land has not yet reached this level. It was found that fertilizers have been introduced at fields already containing a high phosphorus concentration.

Much still has to be done to create a stronger bond between science and practice and to improve the work of all units of the fertility industry. Their efficient, coordinated work is especially important today, in a time when the foundation for the future harvest is being laid.

11004
CSO: 1841/229

UDC 631.547

GROWTH REGULATORS IN PLANT LIFE AND IN AGRICULTURE PRACTICE

Moscow VESTNIK AKADEMII NAUK SSSR in Russian No 1, Jan 82 pp 11-26

CHAYLAKHYAN, M. Kh., academician

[Abstract] The author reviews discoveries and applications of plant growth regulators including stimulators such as auxins, gibberellins, cytoquinines, inhibitors such as ehtylene, abscisic acid, and their synthetic and their physiological analogs, as well as non-hormonal endogenous and exogenous substances (stimulators and inhibitors). Stressing the need for generally favorable growth factors, the author discusses auxins and their synthetic analogs, e.g., 2,4-dichlorophenoxyacetic acid as they affect tomatoes and other vegetables. Gibberellins, discovered in investigating rice plantation diseases in East Asia, have been found to have great impact on such crops as grapes, hemp and malt grains. Cytoquinines, originally discovered as a product of DNA breakdown by Americans F. Scoog and K. Miller, stimulate sprouting and shoot growth, and have been used in cloning microreproduction in the United States, the GDR, and in the USSR at the Academy of Sciences Central Botanical Garden and elsewhere. The inhibitors ethylene, abscisic acid and ethrel are used to hasten fruit ripening and blossoming, and to speed defoliation at the end of the growing season. The synthetic retardants CCC (chlorocholinechloride) and B-995 (N-dimethylaminosuccinic acid) and others have been used to limit winter wheat and rye beat-down and speed tomato ripening, while CCC and other retardants are used to prevent pre-harvest fruit drop and to preserve decorative blossoms. This review by Chaylakhyan address (at the Academy of Sciences) was followed by discussion, which stressed need for a sound agrotechnical basis prior to using these "wonder" substances, and for encouraging increased production of synthetic growth regulators.
[206-12131]

UDC 631.84

PHYSICOCHEMICAL PROPERTIES OF LIQUID NITROGEN FERTILIZERS MADE FROM INDUSTRIAL WASTES

Tashkent UZBEKSKIY KHIMICHESKIY ZHURNAL in Russian No 1, Jan-Feb 82 (manuscript received 6 Nov 80) pp 59-61

UGAY, D. P., KHAMIDOV, Yu. A. and PRISEKINA, L. P., Chemical Institute, UzSSR Academy of Sciences

[Abstract] Liquid nitrogen fertilizers from industrial wastes contain 50-55% ammonium nitrate, 10-15% ammonium sulfate and small amounts of molybdenum and copper, with 22-24% nutrients. The authors studied the effects of adding carbamide on physicochemical properties such as density, viscosity and electrical conductivity. Tests were done in a 20-80° C temperature range. Results showed that when 30% carbamide was added, the activation energy was reduced to 3.4 kilocalories/mol. No chemical reaction between ammonium nitrate and carbamide was observed. Density of the liquid nitrogen fertilizers showed a straight line relationship with temperature in the 20-80°CC range; electrical conductivity increased with increasing temperature in the same manner. Figure 1; references 4: 3 Russian, 1 Western.
[208-12131]

UDC 661.715.5 : 546.39'185

DEVELOPING PROCESS TO OBTAIN 'CARBOAMMOPHOSKA' BASED ON EXTRACTION PHOSPHORIC ACID FROM APATITE CONCENTRATE

Moscow KHIMICHESKAYA PROMYSHLENNOST' in Russian No 4, Apr 82 pp 212-214

BORISOV, V. M., BRODSKIY, A. A., MARKOVA, M. L., AZHIKINA, Yu. V., GRISHAYEV, I. G. and KOZLOVA, Z. A.

[Abstract] Since previous research indicated that the physicomechanical properties of carboammophos hygroscopic compounds were unsatisfactory, the authors designed a technological process to produce a non-caking fertilizer making use of phosphoric acid. The process required control of the pH of the pulp to avoid crystals of monoammonium phosphate with platelet or needle shapes; rather, with pH=6-7 and $NH_3 : H_3PO_4 = 1.4-1.6$, pyramid-shaped crystals that would not cake were produced. Other properties, such as solubility, viscosity, filterability and composition were also changed. The experimental results were subjected to field tests at the Scientific Institute for Fertilizers and Insectofungicides imeni Professor Ya. V. Samoylov. Details of the apparatus, and corrections to it to eliminate a Joule-Thomson choke effect, are described. Temperature control of the pulp to reduce corrosion was achieved with a two-phase process. The final product of this process had properties superior to carboammophoska produced by direct neutralization or the addition of ammonium sulphate. Figures 3; references 5: 3 Russian, 2 English.
[218-12131]

UDC 662.613.1 : 631.893

PILOT PLANT TESTING OF PROCESS FOR OBTAINING SLAG PHOSPHATES WITH MICROELEMENTS

Moscow KHIMICHESKAYA PROMYSHLENNOST' in Russian No 4, Apr 82 pp 214-217

GORYAYEV, M. I, and SOPILIDI, V. N.

[Abstract] The production tests sought to determine the possibility of melting chunks of phosphate ore containing small amounts of copper, zinc and other metals into liquid slags without using sulfuric acid, in order to eliminate the thermal preparation stage in the current process while obtaining a fertilizer containing available P_2O_5 and a number of microelements. Details of the grinding and melting process are diagrammed and explained. The process, at temperatures of 1300-1500° C, could be conducted without interruption, or, periodically. Slagging in the furnace required frequent cleanings. The process yielded a product with the desired microelements that did not dampen or compact readily, and that was assimilated under soil conditions. Metallic sublimates were a secondary product of the process, and the process was less costly than currently used methods for obtaining thermofertilizers. Figures 3.

[218-12131]

UDC 658.511.5 : 631.82

INCREASING USE RELIABILITY OF INDUCTION FLOW METERS IN PRODUCING PHOSPHORUS-CONTAINING MINERAL FERTILIZERS

Moscow KHIMICHESKAYA PROMYSHLENNOST' in Russian No 4, Apr 82 pp 239-240

DOBROLYUBOV, V. V., PETROVSKAYA, V. A., SVISTUNOVA, T. V., PETROVSKIY, V. S., BIREV, Yu. N., GAMMERMAN, M. Ya., RUNOVA, Z. K., GRABYL'NIKOVA, V. I. and GRATSINSKAYA, V. A.

[Abstract] At present, flow meters with 10Kh18N10T steel electrodes that rapidly become pitted and require placement are used in producing the title fertilizers. The authors tested electrodes of 06KhN28MDT and 03KhN60MB alloys in 20-80% sulfuric acid solutions (with 10% increments) and a 93% variant at 60,70,80 and 90° C, in a 10% silicon hydrofluoric acid with various proportions of F : SiO_2, and in other acids at various temperatures. Results showed that the 03KhN60MB, or EP-758, alloy was corrosion-resistant at practically all temperatures and in all acids, while the other alloy could be used only selectively. EP-758 was also durable in extraction phosphoric acids made by dihydrate and semihydrate methods, with 10 times the useful life expected of electrodes made of a 12Kh18N10T alloy. Figures 4.

[218-12131]

UDC 66.011.001 : 632.951

OPTIMIZING CHLOROPHOS PRODUCTION PROCESSES

Moscow KHIMICHESKAYA PROMYSHLENNOST' in Russian No 4, Apr 82 pp 242-243

DENISOV, A. P., SAPOZHKOV, Yu. N., SHCHERBATYKH, Yu. I.,
SHVETSOVA-SHILOVSKAYA, K. D., KLUBOV, A. Ya., LEVCHENKO, G. F. and
MAKSIMOVA, V. A.

[Abstract] Chlorophos is prepared from chloral and dimethylphosphite. Among the 20% impurities in the technical chlorophos are found unreacted chloral and dimethylphosphite, as well as products of side reactions. The current multistage purification process involves neutralization and crystallization; the authors sought to find a more efficient production method using a two reactor method, with sequential loading chloral followed by dimethylphosphite while maintaining temperature. After aging the mixture was subjected to pressure from compressed nitrogen, volatile fractions released, and the final product evaluated. It contained 95-96% active ingredients with 1-1.3% acidity. The process was stated in a mathematical model to determine the directions of gradients to obtain maximum results. [218-12131]

INORGANIC COMPOUNDS

UDC: 546.191:546.766

OXIDATION OF ARSINE BY CHROMIUM (VI) IN PRESENCE OF IODIDE IONS

Leningrad ZHURNAL PRIKLADNOY KHIMII in Russian Vol 55, No 4, Apr 82
(manuscript received 21 Mar 80) pp 761-765

DORFMAN, Ya. A., POLIMBETOVA, G. S., MANSUROV, B. A. and
BIKMUKHAMETOVA, A. K.

[Abstract] One method of purification of exhaust gases to remove arsenic is its oxidation with compounds of Cr (VI). This article studies the reaction of oxidation of arsine by chromium (VI) in the presence of proton ligand catalysts. Studies were performed on a gas flow installation in a 0 gradient isothermal reactor with arsine produced by reducing an As_2O_3 solution with metallic zinc in an acid medium. The arsine was then diluted with argon to 10^{-2}-10^{-3} vol.%. Oxidation was performed in a $K_2Cr_2O_7$-$HClO_4$-KI-H_2O solution. The influence of concentration of all system components and of temperature on reaction kinetics was studied. The reaction rate was found to be a complex function of the concentration of the components and temperature. The reaction follows the stoichiometric equation $4Cr_2O_7^{2-}+3AsH_3+32H^+\rightarrow 8Cr^{3+}+3H_3AsO_4+16H_2O$. The influence of proton acidity was studied at 25 and 40°C. Increasing hydrogen ion content increases the reaction rate of the process. Introduction of iodide ions results in an increase in initial reaction rates without significantly changing the form of the kinetic curves. The iodide ion reaction order is close to 1. Increasing the temperature from 20 to 50°C has a positive influence on reaction rate. A mechanism for the process of oxidation of AsH_3 by chromium (VI) in the presence of iodide ions is suggested. Figures 3; references 10: 7 Russian, 3 Western.
[232-6508]

UDC: 543.247.1:546.791.2

ION-SELECTIVE URANYL ELECTRODE WITH MEMBRANE BASED ON A MIXTURE OF URANYL DI-2-ETHYLHEXYLPHOSPHATE WITH TRIBUTYLPHOSPHATE IN BENZENE

Moscow ZHURNAL ANALITICHESKOY KHIMII in Russian Vol 37, No 4, Apr 82
(manuscript received 5 Jan 81) pp 645-649

SEREBRENNIKOVA, N. V., KUKUSHKINA, I. I. and PLOTNIKOVA, N. V.,
Kemerovo State University

[Abstract] A study is presented of the electrochemical properties of an uranyl electrode with a liquid membrane, a benzene solution of UO_2R_2 mixed with tributylphosphate (TBP). The electrochemical properties of the electrode were studied using a TR-1501 electrometer with EZ-7 strip-chart recorder to record the transmembrane potential difference as a function of uranyl ion activity in aqueous sulfate solutions. The selectivity coefficients were determined by the method of bionic potentials for the electrode with various concentrations of uranyl di-2-ethylhexylphosphate and with various additives of TBP. As the UO_2R_2 concentration is changed the selective properties change with respect to a number of singly and doubly charged ions. The uranyl membrane electrode is more highly selective in the presence of a number of ions and has a lower boundary of uranyl ion content determination that electrodes with the membrane containing only uranyl di-2-ethylhexylphosphate in benzene. The properties of the electrode depend both on the concentration of ion exchange substance and on the quantity of tributylphosphate added. Figures 3; references 7: 5 Russian, 2 Western.
[230-6508]

ORGANOMETALLIC COMPOUNDS

UDC 547.55

N,N'-DIACYLDIIMIDES OF SELENIUM, PART 3: NEW METHODS OF SYNTHESIS

Leningrad ZHURNAL OGRANICHESKOY KHIMII in Russian Vol 18, No 5, May 82 (manuscript received 30 Jun 81) pp 964-967

DERKACH, N. Ya., BARASHENKOV, G. G. and LEVCHENKO, Ye. S., Institute of Organic Chemistry, UkSSR Academy of Sciences, Kiev

[Abstract] Conditions are described under which the reaction of selenyl fluoride or chloride with N,N-bis(trimethylsilyl)amides (I) in a 1:2 molar ratio led to the formation of selenium N,N'-diacyldiimides ($(RSO_2N=)_2Se$). The reaction of I with selenyl fluoride proceeds in ether or dichloroethane at 20°C to completion in 15-20 min; the reaction with selenyl chloride is somewhat slower. Selenium diimides were also obtained by the reaction of iminoselenyl fluorides ($RSO_2N=SeF_2$) with hexamethyldisiloxane; however, the latter did not react with selenyl chloride or iminoselenyl chlorides. Iminoselenyl fluorides were prepared by equimolar reaction of SeF_4 with I. The N-phenyl- and N-methylsulfonyliminoselenyl fluorides are colorless crystals soluble in dichloroethane, benzene, and methylene chloride, show low solubility in CCl_4 and ether, and are hydrolyzed by moisture in air. References 10: 6 Russian, 4 Western.
[252-12172]

UDC: 541.59:546.881

INTERACTION OF VANADIUM (V) WITH CERTAIN PHOSPHORUS-CONTAINING COMPLEXONS

Moscow ZHURNAL NEORGANICHESKOY KHIMII in Russian Vol 27, No 4, Apr 82 (manuscript received 19 Aug 81) pp 833-838

SPITSYN, V. I., PECHUROVA, N. I., STUKLOVA, M. S. and NERENDOOGIYN, N., Moscow State University imeni M. V. Lomonosov

[Abstract] A study is made of the interaction of vanadium (V) with phosphorylated analogs of such widely used complexons as nitrilotriacetic,

ethylenediamine tetraacetic and diethylene triamine pentaacetic acids. The reactions were studied kinetically and spectrophotometrically using twice recrystallized $NaVO_3$ and the complexons. The concentration of complexons was established by measuring the pH. Oxidimetric titration was used to determine the $NaVO_3$ concentration. It is found that the processes of complex formation generally followed the equation $VO_2^{+}+H_nK \rightleftarrows VO_2H_{n-4}K^{3-}+4H^{+}$, where n=5, 6, 8 or 10. Oxidation-reduction interactions in these systems are also studied. The rate of intracomplex redox processes increases in the sequence NTP-ADPA-EDTP-DTPP. This is explained basically by the equivalent increase in reducing capacity of the complexes. Figures 4; references 9: 8 Russian, 1 Western.
[204-6508]

UDC: 542.06+546.713'185

INTERACTION OF MANGANESE DIOXIDE WITH PHOSPHORIC ACID

Moscow ZHURNAL NEORGANICHESKOY KHIMII in Russian Vol 27, No 4, Apr 82 (manuscript received 2 Mar 81) pp 943-948

TETEREVKOV, A. I. and CHUBAROV, A. V., Belorussian Institute of Technology imeni S. M. Kirov

[Abstract] Phosphates of manganese (III) can be obtained by interacting phosphoric acid with potassium permanganate or manganese carbonate with phosphoric acid. The interaction of manganese dioxide with ammonium dihydrophosphate produces mixed ammonium pyrophosphate and manganese (III). However, the interaction of manganese dioxide with phosphoric acid has not been sufficiently studied. The initial substances used in this study were manganese dioxide and phosphoric acid. They were carefully ground and mixed, then placed in crucibles and heated in a muffle furnace. The influence of temperature on completeness of interaction was determined by thermovolumetric measurements in which the reaction mixture was placed in a sealed reactor, heated by an electric furnace at 5-8°C/min, the water vapor liberated was absorbed by sulfuric acid and the volume of oxygen was measured by a gas burette. The quantity of oxygen liberated is proportional to the degree of interaction. The manganese (III) pyrophosphate produced by interacting manganese (III) orthophosphate at 300-450°C with phosphoric acid is stable up to 600°C, above which temperature it decomposes, liberating oxygen. Figures 3; references 7: 4 Russian, 3 Western.
[204-6508]

UDC: 541.9+541.6

COMPLEX COMPOUNDS OF METALS WITH ENANTHIC ACID HYDRAZIDE

Moscow ZHURNAL NEORGANICHESKOY KHIMII in Russian Vol 27, No 4, Apr 82 (manuscript received 12 May 81) pp 972-974

MACHKHOSHVILI, R. I., MITAISHVILI, G. Sh. and PIRTSKHALAVA, N. I., Institute of General and Inorganic Chemistry imeni N. S. Kurnakov, USSR Academy of Sciences; Tbilisi State University

[Abstract] Continuing the studies of complex metal compounds with carboxylic acid hydrazides, the authors attempted to synthesize metal complexes containing enanthic acid hydrazide in the internal molecular sphere. This work briefly describes the synthesis and some results of investigation of the compounds obtained. The compounds produced were: $Mn(HE)_3Cl_2 \cdot 0.5H_2O$; $Mn(HE)_3SO_4 \cdot H_2O$; $Fe(HE)_3SO_4 \cdot 1.5H_2O$; $Co(HE)_3SO_4 \cdot 2H_2O$; $Ni(HE)_3Cl_2 \cdot 3H_2O$; $Ni(HE)_3SO_4 \cdot 2H_2O$; $Cu(HE)_2Cl_2 \cdot H_2O$; $Cu(HE)_2SO_4 \cdot 2H_2O$; $Cd(HE)_3Cl_2 \cdot H_2O$ and $Cd(HE)_3SO_4$. Based on the spectral data and composition of the compounds with Mn, Fe, Co, Ni and Cd, they probably have octahedral structure. In the copper sulfate compound the spectral data indicate that the sulfate radical is in direct contact with the copper atoms and restructures the coordination polyhedron of the metal. References 5 (Russian).
[204-6508]

UDC: 546.881.5'185

MIXED PYROPHOSPHATE $KVOP_2O_7$

Moscow ZHURNAL NEORGANICHESKOY KHIMII in Russian Vol 27, No 4, Apr 82 (manuscript received 6 Apr 81) pp 1072-1073

TETEREVKOV, A. I. and POLOYKO, V. I., Belorussian Institute of Technology imeni S. M. Kirov

[Abstract] Potassium-vanadium pyrophosphate $KVOP_2O_7 \cdot 0.2H_2O$ was obtained by heating a mixture of potassium dihydroorthophosphate, vanadium pentoxide and phosphoric acid in a ratio of 2:1:2 at 350°C for 5 hours. Paper chromatography showed that the product contains only traces of orthophosphate. IR and x-ray phase analyses were performed. The chemical properties of $KVOP_2O_7$ differ significantly from $(VO)2P_2O_7$, which oxidizes rapidly at over 400°C to $VOPO_4$ and melts at 760°C. The new compound is less stable than vanadium orthophosphate $VOPO_4$, which disproportionates with splitting of oxygen and forms a mixture of vanadyl and vanadane phosphates at over 760°C. Figure 1; references 2 (Russian).
[204-6508]

ORGANOPHOSPHORUS COMPOUNDS

UDC 547.963.32:(547.26:678.686)

REACTION PRODUCTS OF ADENOSINE-5'-MONOPHOSPHATE AND 1-HYDROXY-2,3-EPOXYPROPANE

Leningrad ZHURNAL ORGANICHESKOY KHIMII in Russian Vol 18, No 5, May 82 (manuscript received 6 Jul 81) pp 987-991

KORSHAK, V. V., SHTIL'MAN, M. I., TARASOV, V. N., ROGOZHIN, S. V. and VARLAMOV, V. P., Institute of Chemical Engineering imeni D. I. Mendeleyev, Moscow

[Abstract] Studies were conducted on the reaction of adenosine-5'-monophosphate (an active nucleophilic agent leading to the opening of the epoxide ring) with 1-hydroxy-2,3-epoxypropane in dimethylformamide at 20-55°C in sealed ampules filled with argon. The products were separated by TLC and were identified by chemical analysis and evaluation of IR and UV spectra as P-(2,3-dihydroxypropyl)adenosine-5'-monophosphate(I), P-(2,3-dihydroxypropyl)-N^1-(2,3-dihydroxypropyl)adenosine-5'-monophosphate (II), and N^1-(2,3-dihydroxypropyl)adenosine-5'-monophosphate(III). At 55°C, as opposed to lower temperatures, the yields of I and II increased, while that of III decreased. References 9: 3 Russian, 6 Western. [252-12172]

UDC 547.915+547.953

NEW SOLUTIONS IN SYNTHESIS OF GLYCEROPHOSPHATIDES

Leningrad ZHURNAL ORGANICHESKOY KHIMII in Russian Vol 18, No 5, May 82 (manuscript received 26 Mar 81) pp 1115-1116

PREDVODITELEV, D. A., RASADKINA, Ye. N., GRACHEV, M. K. and NIFANT'YEV, E. Ye., Moscow State Pedagogical Institute imeni V. I. Lenin

[Abstract] Glycerophosphoalkylation was employed for the preparation of optically-active glycerothiophosphatides. Conditions are described for the synthesis of 1,2-dipalmitoyl-sn-glycero-3-thiophosphorylcholine,

O-(N-methyl-N-benzylaminoethyl)-O-benzyldiethylamidophosphite, O-(1,2-distearoyl-rac-glycero-3)-O-(N-methyl-N-benzylaminoethyl)-O-benzylphosphite, 1,2-distearoyl-rac-glycero-3-phosphoryl-O-benzyl-O-(N-methyl-N-benzylaminoethanol), and 1,2-distearoyl-rac-glycero-3-phosphoryl-N-methylaminoethanol.
References 3: 2 Russian, 1 Western.
[252-12172]

UDC 577.153

SYNTHESIS AND ANTI-CHOLINESTERASE ACTIVITIES OF O,O-DIISOPROPYLTHIOPHOSPHORIC ACID ESTERS BASED ON NITROGEN-CONTAINING HETEROCYCLES

Tashkent UZBEKSKIY KHIMICHESKIY ZHURNAL in Russian No 1, Jan-Feb 82
(manuscript received 9 Dec 80) pp 31-35

KARIMOV, D. T., DALIMOV, D. N. and ABDUVAKHABOV, A. A., Institute of Bioorganic Chemistry, UzSSR Academy of Sciences

[Abstract] As little detailed information exists on the dependence of selective action on the structure of the alcothiol part of the butylcholinesterase inhibitor molecule in its reactions with the title compound, the authors synthesized several O,O-diisopropylthiophosphates and their methiodides and studied their anticholinesterase activity relative to human erythrocyte acetylcholinesterase and horse blood serum butyrylcholinesterase. Details of the chemical procedures and results are given. All the compositions studied were irreversible cholinesterase inhibitors, but derivatives of morpholine and beta-pipecoline had a weaker inhibiting action, the first because of its hydrophilic grouping, the second because sorption was hampered on the anion portion of acetylcholinesterase. With butyrylcholinesterase, all the compounds were strong selective irreversible inhibitors. The results indicate essential differences in the structure of the hydrophobic framework of anion portions of the two cholinesterases.
References 7: 4 Russian, 3 Western.
[208-12131]

UDC 547.26'118

TRIMETHYLSILYL GROUP MIGRATION IN IMIDOPHOSPHORIC COMPOUNDS

Leningrad ZHURNAL OBSHCHEY KHIMII in Russian Vol 52, No 4, Apr 82
(manuscript received 23 Apr 81) pp 760-763

TIKHONINA, N. A., GILYAROV, V. A. and KABACHNIK, M. I., Institute of Hetero-Organic Compounds imeni A. N. Nesmeyanov, USSR Academy of Sciences

[Abstract] The SiM_3 group readily migrates (West, 1977). Migration of the $SiMe_3$ group has been observed from the nitrogen to the carbon atom

(irreversible), between 2 nitrogen atoms in the $N = P-N$ triad (reversible), and between two oxygen atoms in the pentad $O - P = N - P = O$ (reversible and irreversible). The present article examines reactions of diethylamidophosphate and dibutylamidophosphate with trimethylchlorosilane in the presence of triethylamine. They obtained products like those of Meyer (Tetrahydron Letters, 1969). Infrared, nuclear and proton magnetic resonance spectra were used to confirm the structures of the imidophosphates produced. The $SiMe_3$ groups attached to various atoms in the molecules, regardless of conformational transitions related to temperature increase. Imidophosphate constants from diethylchlorophosphates and from diethylamidophosphates coincided. An analogous $SiMe_3$ migration was observed in the reaction of O,O-diethyl-N,N-bis(trimethylsilyl)amidophosphite with diethylazidophosphite. The authors suggest that an imidophosphate first forms in which the $SiMe_3$ group migrates from the amide to the imide nitrogen atom, or to the phosphoryl oxygen atom. Details are presented in an experimental section.
References 15: 8 Russian, 7 English.
[222-12131]

UDC 547.241 + 547.26'118

REACTION OF ALKYLDIHALOGENPHOSPHINES WITH DERIVATIVES OF TRIVALENT PHOSPHORUS ACIDS

Leningrad ZHURNAL OBSHCHEY KHIMII in Russian Vol 52, No 4, Apr 82
(manuscript received 20 Apr 81) pp 763-768

KABACHNIK, M. M. NOVIKOVA, Z. S. and LUTSENKO, I. F., Moscow State University imeni M. V. Lomonosov

[Abstract] In earlier studies the authors had shown that acid chlorides of trivalent phosphorus acids are highly reactive in nucleophil substitutions, compared to acid bromide and chloride. In the present work the authors studied the reaction of alkyldiiodophosphines and phosphorus triiodide with esters of trivalent phosphorus acids. Analogous to monoiodoanhydrides, diiodianhydrides readily underwent an Arbuzov reaction, but at very low temperatures (below -60° C) the reaction of tert-butyldiiodophosphine with the isopropyl ester of tert-butylphosphonic acid brought formation of diphosphoro-(V)-substituted phosphines that could be isolated by distillation. Most of the latter were thermally stable compounds that readily distilled in a vacuum. Since the reaction of monohalogenanhydrides of phosphorus acids with their esters initially took place on the phosphorus atom, the authors suggest that kinetically controlled products resulted. Use of the general formula $(RO)_2PXP(OR)_2, X=CH_2$ made it possible to synthesize a new type of heteroorganic phosphorus compounds, triphosphacyclobutanes. For simplicity, the authors successfully duplicated the results by the reaction of alkyldiiodophosphines with sodium salts of trivalent phosphorus acids in ether at 0° C. Further variations are also outlined. Chemical details are presented in the experimental section.
References 9: 6 Russian, 3 English.
[222-12131]

UDC 547.26'118

REACTION OF MIXED ESTERS OF PHOSPHORUS(III) ACIDS, CONTAINING SIMULTANEOUSLY ALKOXYL AND TRIORGANOSILOXYL GROUPS AT THE PHOSPHORUS ATOM, WITH HALOGENS, ALKYL HALIDES AND ACYLS

Leningrad ZHURNAL OBSHCHEY KHIMII in Russian Vol 52, No 4, Apr 82
(manuscript received 21 Jan 81) pp 769-776

GAZIZOV, T. Kh., SUDAREV, Yu. I., SHAKIROV, I. Kh., SMIRNOV, V. N. and PUDOVIK, A. N., Institute of Organic and Physical Chemistry imeni A. Ye. Arbuzov, Kazan' Branch, USSR Academy of Sciences

[Abstract] Phosphorus (III) acid esters such as $(R_3SIO)_nP(OR')_{3-n}$ react with alkyl halides and acyls to form corresponding alkyl- and acyl phosphonates. The authors studied such reactions in mild conditions, and learned that dimethyltrimethylsilylphosphites react with chloromethyl esters at 50° C to form 72% dimethylmethoxymethyl phosphonate and 74% trimethylchlorosilane. Diethyldimethylsilylphosphite reacts with benzyl chloride at 80-100° C and 50 mm of mercury pressure to produce 41% trimethylchlorosilane and, after distillation, 50% diethylbenzylphosphonate. In the second stage of reaction with Cl or Br halogens, an electrophil trimethylsilyl group detaches. The authors also found that, when heated in a benzene solution, a tetroxide of (trimethylsiloxy)phosphonium iodide breaks down into tri(trimethylsilyl)phosphate and trimethyliodosilane. The compounds' structures were confirmed by nuclear magnetic resonance of ^{31}P. Introduction of a phosphorus atom of the electron-donor phosphoryl compound made the phosphoryl group more reactive to trimethylhalosilanes. Data obtained confirm the authors' hypothesis that the reaction of mixed esters of phosphorus(III) acids with the title compounds takes place in a stage of competitive separation of unequal radicals with selective desilylation. Chemical details are given in the experimental section. Figures 2; references 22: 17 Russian, 5 English.
[222-12131]

UDC 547.26'118 + 547.442.2

REACTION OF PHOSPHOROUS ACID ESTERS WITH ACID CHLORIDES AND FLUORIDES OF CARBOXYLIC ACIDS

Leningrad ZHURNAL OBSHCHEY KHIMII in Russian Vol 52, No 4, Apr 82
(manuscript received 18 Mar 81) pp 776-780

GAZIZOV, T. Kh., BELYALOV, R. U. and PUDOVIK, A. N., Institute of Organic and Physical Chemistry imeni A. Ye. Arbuzov, Kazan' Branch, USSR Academy of Sciences

[Abstract] Triphenylphosphite reacts with halogenanhydrides of carboxylic acids forming diphenylhalogen phosphite and the phenyl ester of the

corresponding carboxylic acid. To explain the mechanism of such reactions, the authors conducted the title reactions. Their studies indicated that diethylethylphosphonite and triethylphosphite reacted with acetyl chloride in an ether solution at temperature intervals of -113 to 0 and -70 to + 69°C, respectively, with two exothermal effects that indicate a two-stage reaction. Diethylchlorophosphite did not, however, react with ethylacetate even at 100° C for 1 hour. The experimental data confirm that the reaction of trialkylphosphites with acid chlorides of carboxylic acids follow an Arubzov regrouping schema. Triethyl-, diethyl-, phenyl- and diethyl-beta-beta-beta-trichlorothylphosphites react with benzoyl fluoride at 100-130°C in 1 hour to produce diethylfluorophosphite and corresponding benzoic acid esters. In reactions of trialkylphosphites with acid chlorides of carboxylic acids the balance is shifted toward phosphonium chloride, which readily dealkylates to form a suitable acylphosphonate. The authors explain these reactions by a mechanism whereby they pass through an initial reaction of the phosphorus atom of a phosphorous acid ester with carbonyl carbon of benzoyl fluoride. Figure 1; references 19: 16 Russian, 6 Western.
[222-12131]

UDC 542.91 + 547.1'118

REACTION OF 2-SUBSTITUTED 1,3,2-OXAZAPHOSPHOLANES WITH ETHYL ALCOHOL AND PHENOL

Leningrad ZHURNAL OBSHCHEY KHIMII in Russian Vol 52, No 4, Apr 82 (manuscript received 4 Jun 81) pp 781-786

PUDOVIK, M. A., KIBARDINA, L. K. and PUDOVIK, A. N., Institute of Organic and Physical Chemistry imeni A. Ye. Arubzov, Kazan' Branch, USSR Academy of Sciences

[Abstract] The authors studied alcoholysis and phenolysis of several little-studied 2-substituted 1,3,2-oxazophospholanes to determine the effects of such factors as the nature of substitutes at phosphorus, nitrogen and carbon atoms of the ring, the character of the proton-donor reagent, and acidic and basic catalysis. Since secondary processes related to functionally-substituted phosphites and phosphonites complicate such transformations, the reactions were monitored through NMR of ^{31}P spectroscopy. They found that the reaction capability of oxazaphospholanes depends strongly on the nature of the substitute at the endocyclic nitrogen atom. Data indicate that, in all studied reactions, phenolysis of 2-alkoxy(alkyl)-1,3,2-oxazophospholanes takes place much more rapidly than alcoholysis. In studying the effects of acidic and basic catalysis, they learned that in the presence of catalytic quantities of metallic sodium of sodium ethylates, base additions did not have a catalytic effect on alcoholysis of the endocyclic P-N bond. The catalytic action of CH_3COOH during alcoholysis of 1,3,2-oxazophospholanes was tied to the formation of intermediate reacting acylphosphonites or phosphites, resulting from breaking the endocyclic

P-N bond. A nucleophil substitution reaction at the trivalent phosphorus atom was involved. Chemical details are given in the experimental section. Results indicate much faster reaction with acid and basic catalysts present. References 11: 10 Russian, 1 English.
[222-12131]

UDC 547.241

REACTION OF 2-ETHYL-2,5-DIOXO-1,2-OXAZOPHOSPHOLANE WITH ALCOHOLS

Leningrad ZHURNAL OBSHCHEY KHIMII in Russian Vol 52, No 4, Apr 82 (manuscript received 28 Jul 81) pp 786-789

PUDOVIK, A. N., VASYANINA, M. A., POKROVSKAYA, I. K. and KHAYRULLIN, V. K., Institute of Organic and Physical Chemistry imeni A. Ye. Arbuzov, Kazan' Branch, USSR Academy of Sciences

[Abstract] Earlier the authors had shown that the reaction of ethyl or propyl alcohol with the title compound involved an attack of the alcohol on the phosphorus atom and the formation of an ethyl or propyl ester of ethyl(beta-carboxyethyl)phosphonic acid. In the present study they found that ambident phospholanes react with alcohol in two directions, which depend on temperature, the order of adding reagents, and even the number of carbon atoms in the alcohol molecules. Phospholane reacts with propyl alcohol in a single direction, independent of the order of adding reagents, forming a propyl ester of ethyl(beta-carboxyethyl)phosphonic acid, whose isomer can be produced by cooling the reactive mixture. Chemical details are given in the experimental section. References 3 (Russian).
[222-12131]

UDC 547.26'118

FEATURES OF THERMAL STABILITY OF 4,4-DIMETHYL-2-ETOXY-2-OXO-1,3,2-DIOXAPHOSPHOLANE

Leningrad ZHURNAL OBSHCHEY KHIMII in Russian Vol 52, No 4, Apr 82 (manuscript received 22 Jul 81) pp 795-796

NIFANT'YEV, E. Ye. and KRYUCHKOV, A. A., Moscow State Pedagogical Institute imeni V. I. Lenin

[Abstract] The authors studied thermal stability of the title compound in comparison to diethyl-tert-butylphosphates by thermogravimetric analysis and infrared spectroscopy. They found that thermal destruction of phosphate of the latter compound began at 60-70°C, while the cyclical phosphate in the first required temperatures of 140°C and above to bring destruction. They

hypothesize that the phosphate structure prevents conformations and electron redistributions in the molecule that would be found in thermal dealkylation of tert-butyl esters. Chemical details are given in the experimental section. Figures 1; references 1 (English).
[222-12131]

UDC 547.557 + 546.183 + 541.127

PHOSPHORYLATED ADAMANTANES, PART 4: KINETICS OF IMINATION OF 1- AND 2-ADAMANTYL ESTERS OF TRIVALENT PHOSPHORUS ACIDS BY PHENYLAZIDE

Leningrad ZHURNAL OBSHCHEY KHIMII in Russian Vol 52, No 4, Apr 82
(manuscript received 29 May 81) pp 797-801

KASUKHIN, L. F., PONOMARCHUK, M. P., YURCHENKO, R. I., KLEPA, T. I., YURCHENKO, A. G. and GOLOLOBOV, Yu. G., Institute of Organic Chemistry, UkSSR Academy of Sciences; Kiev Polytechnical Institute

[Abstract] Earlier studies of chemical transformations of adamantylphosphites showed that they enter reactions that are typical for trivalent phosphorus. For a proper quantitative comparison of electronic and steric parameters of their radicals, the authors studied kinetics of imination of a number of 1- and 2-adamantyl esters of phosphorous and phenylphosphonic acid, using a nitrogen metering method for control. Results showed that exchanging small MeO and EtO radicals with large 1- and 2-AdO groups had little impact. Analogous comparisons at the second stage showed that one 1-AdO radical at the tetracoordinated phosphorus atom slowed the reaction by a factor of 3-4, while two such groups slowed it by 150-220 times. Unexpectedly, exchanging a methoxyl or ethoxyl radical for a 2-AdO group did not reduce the reaction speed or change the activational characteristics. During distillation, the liquid imides produced apparently underwent imide-amide regrouping accompanied by a reduction in ethoxyl group content in the distilled products. Chemical details are given in the experimental section. References 9: 8 Russian, 1 English.
[222-12131]

UDC 547.241

REACTION CAPABILITY OF HYPOPHOSPHITES, PART 4: REACTION OF ALKYLHYPOPHOSPHITES WITH ALPHA-BROMOCINNAMIC ALDEHYDE

Leningrad ZHURNAL OBSHCHEY KHIMII in Russian Vol 52, No 4, Apr 82
(manuscript received 17 Jun 81) pp 801-808

YUDELEVICH, V. I., SOLONKINA, I. V., SOKOLOV, L. B., IONIN, B. I., KOMAROV, Ye. V., LIFSHITS, M. I. and KARPENKO, M. P., All-Union Scientific Research Technological Institute for Medical-Purpose Antibiotics and Enzymes; Leningrad Technological Institute imeni Lensovet

[Abstract] The authors prepared alkylhypophosphites, and without separating them from its synthesis mixture, reacted them with the title aldehyde, thus making it possible to obtain new synthetic analogs of organic phosphorus antibiotics. Various related substances were produced and their structures confirmed by proton magnetic resonance and infrared spectroscopy. They include white crystalline alkylphosphinates, a colorless transparent acylated ethyl ester of phosphonic acid, an oxaphospholene, an acetylene phospinate, and other products. Biological tests showed that the synthesized final alkylphosphinates and their derivatives have low antifungicidal and moderate antibacterial activity both for Gram-positive and Gram-negative bacteria. Chemical details are given in the experimental section. Figures 4; references 13: 12 Russian, 1 English.
[222-12131]

UDC 547.241

REACTION CAPABILITY OF HYPOPHOSPHITES, PART 5: REACTION OF ETHYLHYPOPHOSPHITE WITH p-AMINOACETOPHENONE

Leningrad ZHURNAL OBSHCHEY KHIMII in Russian Vol 52, No 4, Apr 82
(manuscript received 17 Jun 81) pp 809-810

YUDELEVICH, V. I., FETTER, A. P., KOMAROV, Ye. V. and IONIN, B. I., All-Union Scientific Research Technological Institute for Medical-Purpose Antibiotics and Enzymes; Leningrad Technological Institute imeni Lensovet

[Abstract] Studying the title reaction, the authors determined that independent of proportions of ethylhypophosphate and p-aminoacetophenone, both 1-hydroxyphosphonite and the product of dehydration, the ethyl ester of 1-(4-aminophenyl)ethene phosphonic acid, formed when the reaction was conducted in ethyl alcohol at 70-78° C. Separation of final products was hampered by use of other solvents, such as pyridine and dioxane, but analogous results were confirmed by thin-layer chromatography. Infrared and proton magnetic resonance spectroscopy were employed to confirm structures of the compounds obtained. Chemical details are given in the experimental section. References 6: 3 Russian, 3 English.
[222-12131]

UDC 547.341

SYNTHESIS AND TRANSFORMATIONS OF DICHLOROANHYDRIDES OF 1-METHOXY-2,3-ALKADIENE-2-PHOSPHONIC ACIDS

Leningrad ZHURNAL OBSHCHEY KHIMII in Russian Vol 52, No 4, Apr 82
(manuscript received 10 Jul 81) pp 816-825

BREL', V. K., IONIN, B. I. and PETROV, A. A., Leningrad Technological Institute imeni Lensovet

[Abstract] The authors show that the title dichloroanhydrides are suitable initial compounds for the synthesis of 1,3-alkadienephosphonic derivatives, and can also be used to obtain esters, phosphine oxides and other allenes containing phosphorus. Their tendency to acetylene-allene isomerization depends strongly on the nature of the acetylene alcohol used. The structures of the compounds produced were confirmed by infrared, proton magnetic resonance and ^{31}P nuclear magnetic resonance spectroscopy. They are more suitable than direct synthesis for producing oxides of dialkyl(1-methoxy-2,3-alkadiene-2-yl)phosphines. The authors found that their dichloroanhydrides react exclusively with methyldichlorosilane to produce dichloroanhydrides of 3-chloro-1,3-alkadiene-2-phosphonic acids, with no hydrogen chloride produced. The latters' structures were confirmed by infrared, PMR and NMR of ^{1}H, ^{31}P and ^{13}C. The title dichloroanhydrides also produced 1,3-alkadienes with a phosphorus atom at the first carbon atom of the 1,3-butadiene system. Chemical details are given in the experimental section. Figures 4; references 17: 14 Russian, 3 English.
[222-12131]

UDC 542.91 : 547.1'118

PHOSPHORYLATION AND ALKYLATION OF DIISOPROPYLTHIOPHOSPHORIC ACID BY COMPLETE MONOAMIDOPHOSPHITES

Leningrad ZHURNAL OBSHCHEY KHIMII in Russian Vol 52, No 4, Apr 82
(manuscript received 22 May 81) pp 825-830

YELISEYENKOV, V. N. and SHUMILINA, T. N., Institute of Organic and Physical Chemistry imeni A. Ye. Arbuzov, USSR Academy of Sciences

[Abstract] Continuing their earlier studies of phosphorylation, the authors studied reactions of 0,0-diisopropylthiophosphoric acid with various dialkyl(diethylamido) phosphites, which yielded mixed anhydrides of 0,0-diisopropylthiophosphoric and dialkylphosphorous acids. The composition and structure of these products were confirmed by elemental analysis, NMR of ^{31}P and certain chemical transformations. The mixed anhydrides were thermally stable at temperatures of 100° C and above. Temperature variation in the reactive mixture affected the exact product of the given reaction.

The results indicate the presence of two cation forms, one with a proton bond to the nitrogen atom and another, to the phosphorus atom; the latter bonding did not take place at temperatures below [illegible]00° C, but only at 150-170°. Chemical details are given in the experimental section. Figure 1; references 10: 7 Russian, 3 Western.
[222-12131]

UDC 547.558.1

SYNTHESIS AND STUDY OF TETRAARYLPHOSPHONIUM SALTS CONTAINING FORMYL

Leningrad ZHURNAL OBSHCHEY KHIMII in Russian Vol 52, No 4, Apr 82 (manuscript received 9 Feb 81) pp 830-838

SHEVCHUK, M. I. and BUKACHUK, O. M., Chernovtsy State University

[Abstract] Continuing earlier studies, the authors sought possible ways to synthesize phosphonium salts based on the reaction of triphenylphosphine with p-bromobenzaldehyde, 5-bromo-2-formylthiophenyl and 5-bromo-2-formylfurane. The reactions took place only in sealed ampules with a double quantity of triphenylphosphine. The reaction took place under more moderate conditions with 5-bromo-2-formylfurane, apparently because of a more mobile halogen atom in 5-bromo-furfural. With a triple surplus of potassium permanganate in oxidizing the product 2-formylthienyl-5-(triphenylphosphonium) bromide, a triphenylphosphonium group separated as a triphenylphosphine oxide, along with the usual aldehyde group oxidation to the carboxyl group. Other products of the reactions include phosphonium hydrazones, aryledenium hydrazones, azomethynes, and phosphonium styryls. Ultraviolet and infrared spectroscopy were used to confirm the structures of the products obtained. Chemical details are given in the experimental section. References 2: 1 Russian, 1 Italian.
[222-12131]

UDC 547.341

STUDY OF DERIVATIVES OF PHOSPHONIC AND PHOSPHONOUS ACIDS, PART 108: INFRARED SPECTROSCOPY STUDY OF E,Z-ISOMERIZATION OF PHOSPHORYLATED ENAMINES

Leningrad ZHURNAL OBSHCHEY KHIMII in Russian Vol 52, No 4, Apr 82 (manuscript received 9 Jun 81) pp 838-843

ALIKIN, A. Yu., SOKOLOV, M. P., LIORBER, B. G., YARKOVA, E. G., RAZUMOV, A. I. and ALPAROVA, M. V., Kazan' Chemical and Technological Institute imeni S. M. Kirov

[Abstract] Continuing work on the fine structure of secondary phosphorylated enamines, the authors studied E-and Z-isomerization in heavily diluted

solutions to determine the connection between spectral characteristics of infrared spectra and structural features of the molecules. Solutions of 0.5-0.005 mol/l in carbon tetrachloride, chloroform and acetonitryl with the indicated substances showed Z- and E-forms with intramolecular and intermolecular hydrogen bonds, respectively. They also studied 2-methyl-3-diisopropoxyphosphonyl-6-methoxy-1,4,5,6-tetrahydropyridine as a fixed model of secondary phosphorylated ketone enamine where no Z- form could exist. The infrared spectroscopic data obtained, and NMR information, confirmed the existence of mixed E- and Z-forms of secondary phosphorylated ketone enamines. Deformational variations of the NH bond and valent variations of the ethylene and NH bonds were observed in both E- and Z-isomers. References 4 (Russian).
[222-12131]

UDC 547.241

REACTION OF 0,0-DIETHYL-alpha-METHYLAMINOBENZYL PHOSPHONATE WITH CARBON DISULFIDE

Leningrad ZHURNAL OBSHCHEY KHIMII in Russian Vol 52, No 4, Apr 82
(manuscript received 25 May 81) pp 843-847

PROKOF'YEVA, A. F., ALESHNIKOVA, T. V., NEGREBETSKIY, V. V., MEL'NIKOV, N. N. and KOROLEVA, T. I., All-Union Scientific Research Institute for Chemical Means of Plant Protection

[Abstract] Since there are relatively few data on the behavior of carbanions formed from dialkylaminoalkylphosphonates in reactions with electrophil reagents, the authors studied the title reaction, which produced a carbanion that in turn decomposed into a benzalmethylamine and sodium diethylphosphite. The structures of the compounds obtained were confirmed by NMR of ^{31}P. Addition of methyl iodide to the reactive mixture brought a mixture of benzalmethylamine, 0,0-diethylmethylphosphonate and 0,0-diethyl-alpha-methyl-alpha-methylaminobenzylphosphonate. Boiling of the title compound with sodium hydride in absolute tetrahydrofurane brought complete conversion into the carbanion, with a complex mixture of products, of which the authors identified only 0,0-diethyl-alpha-methylamino-alpha-[(ethylthio)-thiocarbonyl]benzylphosphonate (or its analog), benzaldehyde and 0-ethyl-alkyl-xanthogenates. Infrared, ^{31}P, ^{1}H and ^{13}C NMR spectroscopy confirmed the structures of the latter compounds. Chemical details are given in the experimental section. References 8: 1 Russian, 7 Western.
[222-12131]

UDC 547.26'118

REACTIONS OF ASYMMETRICAL PHOSPHORUS-CONTAINING AMINODI- AND -TRISULFIDES

Leningrad ZHURNAL OBSHCHEY KHIMII in Russian Vol 52, No 4, Apr 82
(manuscript received 25 May 81) pp 847-849

TOLMACHEVA, N. A. and KHASKIN, B. A., All-Union Scientific Research Institute for Chemical Means of Plant Protection

[Abstract] After earlier showing that the direction of symmetrical tri- and tetrasulfides containing phosphorus reacting with nucleophil reagents is dependent on electron-acceptor effects of phosphoryl and thiophosphoryl groupings, the authors here show that dialkoxyphosphoryl- and thiophosphoryl-N-dialkylaminodi- and -trisulfides react with secondary amines in a way analogous to phosphorus-containing polysulfides. The disulfide bond closest to the phosphorus atom is broken and bis(dialkylamino) mono- and disulfides, and corresponding ammonium salts of thio- and dithioacids of phosphorus, are formed. In reaction with derivatives of trivalent phosphorus, products are formed that contain one sulfur atom less than the initial compounds. Their reactions with thio- and dithiophosphoric acids lead to the formation of bis(dialkyloxythiophosphoryl)tetrasulfides, or products of their partial desulfurization. Chemical details are given in the experimental section. References 8: 5 Russian, 3 Western.
[222-12131]

UDC 547.241

REACTION OF PHOSPHORUS PENTACHLORIDE WITH DIVINYLSULFIDE

Leningrad ZHURNAL OBSHCHEY KHIMII in Russian Vol 52, No 4, Apr 82
(manuscript received 3 Apr 81) pp 850-853

FRIDLAND, S. V., SHKURAY, I. A. and LAPTEVA, L. I., Kazan' Chemical and Technological Institute imeni S. M. Kirov

[Abstract] Earlier studies had shown that O_2 complexes have affected reactions of phosphorus pentachloride with divinyl ester. Other studies have disagreed. The authors conducted the title reaction so the substitutes in the alpha-position were prevented from taking part in the reaction, and it was possible to compare the effects of heteratoms. The reaction was conducted at 10-15° C by dripping divinylsulfide into phosphorus pentachloride suspended in benzene. Results showed high reactivity compared to earlier adducts that under analogous conditions stabilized at the donor-acceptor stage. Analysis showed that, along with the $C_4H_4SP_2Cl_8$ first noted, dichloranhydrides of beta-(vinylthia)vinylphosphonic acid and beta-(alpha-chloroethylthia)vinylphosphonic acid were formed. Treatment with sulfur dioxide of the first compound brought 4-chloro-4-oxo-2,5-diene-1,4-thiaphosphine, and addition of water produced 4-oxy-1-thia-4-phosphahexacyclo-2,5-diene-4-oxide. Figures 4, references 5 (Russian).
[222-12131]

UDC 547.1'118

REACTION OF S-ETHYLPHENYLTHIOPHOSPHINITE WITH CHLORANYL

Leningrad ZHURNAL OBSHCHEY KHIMII in Russian Vol 52, No 4, Apr 82
(manuscript received 28 Jul 81) pp 924-925

AL'FONSOV, V. A., DIANOVA, O. M., GOL'DFARB, E. I., BATYYEVA, E. S. and
PUDOVIK, A. N., Institute of Organic and Physical Chemistry
imeni A. Ye. Arubzov, Kazan' Branch, USSR Academy of Sciences

[Abstract] Reactions of trivalent phosphorus derivatives as a rule lead to bipolar compositions with a 1:1 ratio, with a preliminary stage of single electron transfer from the P^{III} atom to quinone. The authors studied the title reaction in benzene, and obtained p-ethoxytetrachlorophenyl ester of diphenylthiophosphonic acid. Its composition and structure were studied by NMR of ^{31}P and ^{1}H spectroscopy and element analysis, and proton magnetic resonance. Chemical polarization study indicated the presence of a radical manner of formation. Replacing benzene with more polar solvents led to a halt in the reaction at the stage of bipolar ion formation, indicating stabilization of the quasiphosphonium center by the solvent molecules. Chemical details and spectroscopic findings are given. References 4: 2 Russian, 2 English.
[222-12131]

UDC 547.241 + 547.73

SYNTHESIS OF OXIDES OF HEPTYL-2-(5-R-DITHIENYL)PHOSPHINES

Leningrad ZHURNAL OBSHCHEY KHIMII in Russian Vol 52, No 4, Apr 82
(manuscript received 25 May 81) pp 925-926

KRASIL'NIKOVA, Ye. A., RAZUMOV, A. I. and SHARAFIYEVA, E. S., Kazan'
Chemical and Technological Institute imeni S. M. Kirov

[Abstract] The authors found an expedient method for introducing a phosphoryl group into the thiophene ring enabling them to produce 60-80% oxide yields of heptyldithienylphosphines, including ones with a substitute at the 5-thiophene position. Thiophene and its derivatives reacted with heptyldichlorophosphine oxide in the presence of zinc powder at room temperature with steady mixing for 5 hours. The structure of the compounds was confirmed by infrared, PMR and ^{1}H and ^{31}P NMR.
[222-12131]

UDC 546.18 + 546.267

REACTION OF N,N,N'-TRIS(TRIMETHYLSILYL)AMIDE OF IMIDOPHOSPHENIC ACID AND N,N-BIS(TRIMETHYLSILYL)-1,3,2-DIOXAPHOSPHOLANE WITH 1,1,3-TRIHYDROTETRAFLUOROPROPYLCYANATE

Leningrad ZHURNAL OBSHCHEY KHIMII in Russian Vol 52, No 4, Apr 82
(manuscript received 12 Oct 81) pp 926-927

ROMANENKO, V. D., VOLKOV, G. I. and MARKOVSKIY, L. N., Institute of Organic Chemistry, UkSSR Academy of Sciences

[Abstract] Continuing earlier related work, the authors studied a phosphenite reaction that preserved the coordination number of the phosphorus and led to a functionally substituted amide of imidophosphenic acid. The first title compound reacted with 1,1,3-trihydrotetrafluoropropylcyanate, forming an N,N'-bis(trimethylsilyl)-N-(1,1,3-trihydrotetrafluoropropoxy-N"-trimethylsilylcarbonimidoil)amide of imidophosphenic acid. The direction of electrophil attack was structurally indiscernible. The NMR spectra of ^{31}P corresponded to those of imidophosphates, while infrared spectra showed variations typical for C=N, P^{V}=N, and C-O-C bonds. Chemical details are given. References 3: 2 Russian, 1 German.
[222-12131]

UDC 542.91 : 547.1'118

REACTION OF ANHYDRIDES OF PHOSPHORUS ACIDS WITH ACETYL CHLORIDE

Leningrad ZHURNAL OBSHCHEY KHIMII in Russian Vol 52, No 4, Apr 82
(manuscript received 3 Nov 81) pp 927-928

YELISEYENKOV, V. N. and SHUMILINA, T. N., Institute of Organic and Physical Chemistry imeni A. Ye. Arbuzov, Kazan' Branch, USSR Academy of Sciences

[Abstract] Depending on structure, amidophosphites react with acetyl chloride either at the phosphorus or the nitrogen atom. The authors studied the effect of acetyl chloride on mixed anhydrides of O,O-dialkylthiophosphoric and amidophosphorous acids. Unexpectedly, symmetrical anhydrides containing 3 phosphorus atoms and acetamide were obtained. Control experiments showed that one product of the reaction was actually a dichlorophosphite. Structures of the anhydrides were confirmed by element analysis, PMR and NMR of ^{31}P spectroscopy. They were unstable compounds that developed disproportions during the experiments. Chemical details are given. References 7: 5 Russian, 2 Western.
[222-12131]

UDC 547'241

REDUCTION OF OXIMINOCARBAMOYLMETHYLPHOSPHONATES

Leningrad ZHURNAL OBSHCHEY KHIMII in Russian Vol 52, No 4, Apr 82
(manuscript received 26 Oct 81) p 929

KHOKHLOV, P. S., KASHEMIROV, B. A. and STREPIKHEYEV, Yu. A., Moscow Chemical Technology Institute imeni D. I. Mendeleyev

[Abstract] Continuing their earlier work, the authors showed that the title phosphonates are selectively reduced by aluminum amalgam forming α-aminocarbamoylmethylphosphonates. The structure of the compounds obtained was confirmed by element analysis, infrared, PMR and mass spectroscopy. Chemical details for obtaining O,O-diethyl-α-aminocarbamoylmethylphosphonate, O,O-diethyl-α-amino-N-ethylcarbamoylmethylphosphonate and O,O-diethyl-α-amino-N,N-diethylcarbamoylmethylphosphonate are given. Reference 1 (Russian).
[222-12131]

UDC 547.879.87

SYNTHESIS OF 1,4-DIAZA-2,5-DIPHOSPHANES BY REACTION OF ALKYLCHLOROPHOSPHITES WITH BENZALANILINE

Leningrad ZHURNAL OBSHCHEY KHIMII in Russian Vol 52, No 4, Apr 82
(manuscript received 16 Jul 81) pp 930-931

MAYDANOVICH, N. K., IKSANOVA, S. V. and GOLOLOBOV, Yu. G., Institute of Organic Chemistry, UkSSR Academy of Sciences

[Abstract] The authors found that alkylchlorophosphites react with benzalanilines at 130-180° C in 1-3 hours to form 1,4-diaza-2,5-diphosphanes, with 30-35% yield. The easiest reaction was with methylchlorophosphite, at 140° C for 40 minutes; ethyldichlorophosphite (160-170° C for 2 hours) and diethylchlorophosphite (170-180° C for 3 hours) reacted with more difficulty. The composition and structure of the products were confirmed by elemental analysis and molecular mass, and infrared and NMR spectroscopy. They were 2,5-dichloro-1,4-diaza-2,3,4,6-tetraphenyl-2,5-diphosphane, and 2,5-diethoxy-1,4-diaza-2,3,4,6-tetraphenyl-2,5-diphosphane.
Reference 1 (Russian).
[222-12131]

UDC 547.341

FORMING GEOMETRIC ISOMERS OF DICHLOROANHYDRIDE OF 1-METHOXY-3-CHLORO-4-METHYL-2,4-PENTADIENE-2-PHOSPHONIC ACID IN ACETYLENE-ALLENE-DIENE ISOMERIZATION

Leningrad ZHURNAL OBSHCHEY KHIMII in Russian Vol 52, No 4, Apr 82
(manuscript received 6 Oct 81) pp 932-933

BREL', V. K., NOSOV, B. P., IONIN, B. I. and PETROV, A. A., Leningrad Technological Institute imeni Lensovet

[Abstract] To compare mobility of the alkoxy group and halogen in the allene phosphonate molecule and broaden the synthetic possibilities of such a conversion, the authors attempted synthesis of the dichloroanhydride of 1-methoxy-4-methyl-5-chloro-2,3-pentadiene-2-phosphonic acid. Allene-diene isomers formed in the synthesizing process, leading to formation of geometric isomers of the title dichloroanhydride. The structure of the isomers was confirmed by infrared, PMR and NMR spectroscopy, and also by the ASIS effect. The ease of allene-diene isomerization with chlorine shift was apparently related to the presence of a methyl group at position 4, allowing stabilization of the carbocation when the halogen separated.
References 5: 3 Russian, 2 English.
[222-12131]

UDC 547.341.07

DIMETHYLADAMANTYLDICHLOROPHOSPHINE, A NEW TRIVALENT PHOSPHORUS CHLOROANHYDRIDE

Leningrad ZHURNAL OBSHCHEY KHIMII in Russian Vol 52, No 4, Apr 82
(manuscript received 5 Aug 81) pp 933-934

NO, B. I., ZOTOV, Yu. L. and KAREV, V. N., Volgograd Polytechnical Institute

[Abstract] Previously, only one trivalent phosphorus dichloranhydride had been described, requiring many stages to produce small yields. The authors synthesized the title compound from dimethyladamantane and phosphorus trichloride in the presence of anhydrous aluminum chloride with heating at 80-90° C for 3-5 hours. Excess phosphorus trichloride served as a solvent. Yield was 48%. Reference 1 (German).
[222-12131]

UDC 547.241

ALKYLATION CAPABILITY OF ALKYL(PERFLUOROALKYL)PHOSPHINATES

Leningrad ZHURNAL OBSHCHEY KHIMII in Russian Vol 52, No 4, Apr 82
(manuscript received 8 Jul 81) pp 935-936

MASLENNIKOV, I. G., PROKOF'YEVA, G. N., LAVRENT'YEV, A. N. and
SHCHERBAYEVA, M. M., Leningrad Technological Institute imeni Lensovet

[Abstract] Esters of trifluoromethyl-substituted phosphorus acids are known to have alkylating capability. The authors discovered that heating $CH_3(CF_3)P(O)OCH_3$ with $CF_3P(OC_4H_9)_2$ brought formation of a new phosphinate, $CH_3(CF_3)P(O)OC_4H_9$. Partial ester interchange additionally brought $CF_3P(OCH_3)(OC_4H_9)$, which formed only in the presence of the first phosphinate. NMR spectra agreed with those in other studies for analogous compounds. Chemical details are given. References 5: 2 Russian, 3 English.
[222-12131]

UDC 547.454 + 547.26.118

ALDEHYDE PENTOSE CONDENSATION WITH PHOSPHORUS ANALOGS OF CARBONYL COMPOUNDS

Leningrad ZHURNAL OBSHCHEY KHIMII in Russian Vol 52, No 4, Apr 82
(manuscript received 28 Jul 81) pp 937-938

ZHDANOV, Yu. A., UZLOVA, L. A. and MAKSIMUSHKINA, L. M., Rostov-na-donu
State University

[Abstract] The reactions of aldehyde sugars with isocyanacetic and nitroacetic esters and other compounds with an active methyl group were used to synthesize functional-substituted monosaccharides. The authors studied the condensation of aldehydo-L-arabinose and -L-xylose with phosphonoacetic ester and cyanophosphonomethane in benzene in the presence of piperidine. The reaction proceeded randomly to form several substances that were hard to isolate when phosphonoacetic acid was used. With cyanophosphonomethane, a more regular reaction produced nitryl-2,3-didesoxy-2-dibutoxyphosphonyl-4,5; 6,7-di-O-isopropylidene-L-arabinoheptenic acid and analogs, with up to 45% yield. Structures were confirmed by infrared spectroscopy. References 7: 3 Russian, 2 English, 2 German.
[222-12131]

UDC 547.455 : 546.183

1,2-CYCLOPHOSPHITES OF 3,5,6-TRIMETHYLGLUCOFURANOSE AND 3,5-DIMETHYLXYLOFURANOSE

Leningrad ZHURNAL OBSHCHEY KHIMII in Russian Vol 52, No 4, Apr 82
(manuscript received 28 Jul 81) pp 938-939

NIFANT'YEV, E. Ye., RUMYANTSEVA, S. A., KOROTEYEV, M. P., SISNEROS, Ks. and KOCHETKOV, N. K., Moscow State Pedagogical Institute imeni V. I. Lenin

[Abstract] While cyclophosphites and bicyclophosphites of sugars obtained by phosphorylation of partially protected hydrocarbons are well known, glycosylcyclophosphites have not previously been obtained. Following the example of phosphorylation of 3,5,6-tri-O-methyl-α,β-D-glucofuranose and 3,5-di-O-methyl-α,β-D-xylofuranose by hexaethyltriamide of phosphorous acid at 100-110° C, the authors obtained glycosylamidocyclophosphites for the first time, and began study of their stereochemistry and chemical properties. Structures were confirmed by NMR of ^{1}H, ^{13}C and ^{31}O. Chemical details are given. References 5: 4 Russian, 1 English.
[222-12131]

UDC: 546.147:547.558.1

TETRAPHENYLPHOSPHONIUM PERBROMATE

Moscow ZHURNAL NEORGANICHESKOY KHIMII in Russian Vol 27, No 4, Apr 82
(manuscript received 19 Sep 80) pp 1061-1063

BORISOVA, I. V. and LYCHEV, A. A., Radium Institute imeni V. G. Khlopin

[Abstract] Ph_4PBrO_4 was produced using a method utilized earlier to produce Ph_4PClO_4. It is shown that when BrO_4^- is potentiometrically titrated with Ph_4P^+, a difficulty soluble compound is formed and precipitates. The purity of the product was tested spectrophotometrically and chromatographically. The BrO_3^- impurity does not exceed 0.05%. The x-ray phase analysis performed showed that tetraphenylphosphonium perbromate has the same structure as tetraphenylphosphonium perchlorate, but not potassium perbromate. Figure 1; references 9: 1 Russian, 8 Western.
[204-6508]

UDC: 548.737

STRUCTURE OF ORGANOPHOSPHORUS COMPOUNDS, PART 22: X-RAY STRUCTURAL STUDY OF 2-TRICHLOROPHOSPHAZOPERCHLOROPROPANE $Cl_3P=N-CCl(CCl_3)_2$

Novosibirsk ZHURNAL STRUKTURNOY KHIMII in Russian Vol 23, No 2, Mar-Apr 82 (manuscript received 23 Mar 81) pp 72-76

ANTIPIN, M. Yu., STRUCHKOV, Yu. T., YURCHENKO, V. M. and KOZLOV, E. S., Institute of Heteroorganic Compounds imeni A. N. Nesmeyanov, USSR Academy of Sciences; Institute of Organic Chemistry, Ukrainian Academy of Sciences

[Abstract] The purpose of this study was to establish the precise value of angle PNC and the length of the P=N and C-N bonds, and also to determine the variation between these geometric parameters by comparison of data for a number of phosphazo compounds which have been structurally studied. The phosphorus atom is found to have the ordinary distorted tetrahedral configuration, P-Cl bond length 1.982-1.984 A, close to the bond length in crystalline phosphorus oxychloride. The valent angles at the phosphorus atom range from 102.2 to 119.0°, the mean value for ClPCl angles being significantly less than for ClPN angles (103.6 and 114.8°). The P-N bond is 1.504 A in length, the N-C bond is 1.387 A in length. C(1)-C(2) is 1.601 A, C(1)-C(3) is 1.598 A. A comparative analysis of the geometric parameters of the P=N-X fragment is performed for this class of compounds as a function of the nature of substituent X. Figure 1; references 26: 8 Russian, 18 Western.
[231-6508]

UDC: 548.757+615.748+541.69

CRYSTALLINE AND MOLECULAR STRUCTURE OF HIGH-MELTING MODIFICATION OF O-(β-DIMETHYLAMINOETHYL)PHENYL-α-OXYCYCLOHEXYLPHOSPHINATE IODOMETHYLATE $[C_6H_5(CYCLO-C_6H_{10}OH)P(O)O(CH_2)_2N(CH_3)_3]^+I^-$: CONFORMATIONAL POLYMORPHISM OF CERTAIN α-OXYPHOSPHORYL COMPOUNDS

Novosibirsk ZHURNAL STRUKTURNOY KHIMII in Russian Vol 23, No 2, Mar-Apr 82 (manuscript received 23 Mar 81) pp 81-87

KARDANOV, N. A., TKACHEV, V. V., ATOVMYAN, L. O., GODOVIKOV, N. N. and KABACHNIK, M. I., Institute of Heteroorganic Compounds imeni A. N. Nesmeyanov, USSR Academy of Sciences; Department of Institute of Chemical Physics, USSR Academy of Sciences

[Abstract] Continuing their work on methods of synthesis of β-aminoethyl esters of α-oxyphosphinic acids and their derivatives, the authors established that the compound in the title (I) forms two stable polymorphous modifications upon crystallization from nitromethane, with melting points of 175-176 and 192-193°C. Results are presented from an x-ray structural study of the

cyrstals of the higher melting modification of I. The results indicate that the primary cause of the polymorphism in these compounds is the conformation state of the fragment $HO-C-P=O$. Characteristic group frequencies of valent oscillations and IR spectra of the polymorphous modifications confirm the formation of strong intermolecular H bonds. Figures 3; references 14: 13 Russian, 1 Western.
[231-6508]

UDC 54-386 : 541.128 : 542.978 : 542.943.7 : 547.534.1

INHIBITING PROPERTIES OF HEAVY METAL CHELATES WITH LIGANDS BASED ON AMINOMETHYLENE DERIVATIVES OF FIVE-MEMBERED HETEROCYCLES IN ETHYLBENZENE OXIDATION REACTION

Moscow NEFTEKHIMIYA in Russian Vol 22, No 2, Mar-Apr 82 pp 254-258

MAZALETSKIY, A. B., VINOGRADOVA, V. G., ALAM, L. V. and KVITKO, I. Ya., Institute of Chemical Physics, USSR Academy of Science, and Leningrad Technological Institute imeni Lensovet

[Abstract] Sulfur-containing heavy metal chelate compounds with $M(S,S)_2$ and $M(N,S)_2$ chelate units inhibit low-temperature hydrocarbon oxidation. The authors studied several inhibitors of ethylbenzene oxidation. The chelate ligands were aminomethylene derivatives of ketones, thiones and selenones of five-membered N-phenyl-pyrazole, furane and thiophene, with $M(N,O)_2$, $M(N,S)_2$ and $M(N,SE)_2$ chelates. The effects of chelate unit composition and the nature of the substitute in the ligand's azomethyne group and of the heterocycle in the ligand, on inhibiting activity, were studied. Tests were conducted at 65-80° C at atmospheric pressure with oxygen or air as the oxidizing gas, and nitrobenzene as an inert solvent. Braking of low-temperature initial oxidation pointed to interaction of chelates and free radicals. A correlation was established for $M(IS)_2$ chelates between the polarographic oxidation potential and inhibiting activity: the more readily oxidizing chelate units had greater inhibiting action. Changing the structure of Cu(II) from planar to tetrahedral while maintaining polarographic oxidation potential brought a sharp increase in antiradical activity of the chelate compounds, as did a switch from sulfur- to selenium-containing zinc compounds and in general, electron-donor substitutes at the nitrogen atom. Figures 2; references 9 (Russian).
[221-12131]

UDC 547.571 : 542.943 : 541.127

SELECTIVITY OF LIQUID PHASE BENZALDEHYDE OXIDATION AT DEEP CONVERSION LEVELS

Moscow NEFTEKHIMIYA in Russian Vol 22, No 2, Mar-Apr 82 pp 259-264

IVANOV, A. M. and CHERVINSKIY, K. A., Chernovtsy State University

[Abstract] To control oxidation conversions of many alkyl-aromatic compounds, knowledge of the direction of deep oxidation of benzaldehyde is essential, and the selectivity of such simpler oxidation processes must be controlled. The authors present a diagram of the chain and heterolytic consumption of benzaldehyde, taking into account that one of the reagents is a per-acid, the product of the chain oxidation. A unique combination of consecutive and parallel reactions occurs, with maximum per-acid yield at the point of practically 100% aldehyde conversion. The rate of heterolytic aldehyde oxidation could not be slowed for want of a negative catalyst. The chain oxidation required constant O_2 in a liquid phase, which limited the conversion rate. The best catalysts in selective conversion of benzaldehyde and benzoylphenyloxymethylperoxide were acetate and cobalt benzoate; they were transitional in aldehyde conversion degree and did not speed the breakdown of oxyperoxide. In deep-liquid-phase benzaldehyde oxidation, cobalt salts and monobasic acids were simultaneously catalysts for homolytic and heterolytic stages of the oxidation process. Figures 5; references 10: 9 Russian, 1 English.
[221-12131]

UDC 542.943.8 : 541.128 : 541.124

SELECTIVE ACTION OF ANTIOXIDANTS IN OXIDATION OF ORGANIC COMPOUNDS

Moscow NEFTEKHIMIYA in Russian Vol 22, No 2, Mar-Apr 82 pp 278-283

NEKIPELOVA, T. D. and GAGARINA, A. B., Institute of Chemical Physics, USSR Academy of Sciences

[Abstract] Selective antioxidant braking is often a feature of hydrocarbon oxidation processes. The authors studied such action and sought their causes for phenols, hydrated quinolines and stable nitroxyl radicals in alkyl-aromatic saturated and unsaturated hydrocarbons, ethylbenzene, styrene and phenylacetylene at 120 and 110° C, controlling the process by monitoring accumulations of ethylbenzene hydroperoxides and consumption of styrene and phenylacetylene. Essential differences in chemical mechanisms and kinetic principles were noted at high temperatures that were related to the nature of reaction center molecules, free radicals and the products formed. A noticeable braking effect was observed with a $\sim 10^{-4}$ mol/l concentration of ethylbenzene ($\sim 10^{-2}$ for ethoxyquine), and $\sim 10^{-2}$ in styrene and phenylacetylene. The most effective retardant in styrene was the nitroxyl radical, with ethoxyquine more effective in phenylacetylene and ionol in ethylbenzene.

Temperatures above 100° C brought much greater consumption of antioxidants. Quinoline braking of phenylacetylene oxidation is attributed to the long life of R radicals and to their chemical structure. The effectiveness of ethoxyquine in ethylbenzene is determined by the direct reaction of the inhibitor with hydroperoxides. Figures 3; references 12: 11 Russian, 1 English.
[221-12131]

UDC 661.183.123

THERMAL PROPERTIES OF STABILIZED COPOLYMERS OF VINYLBENZYLCHLORIDE WITH DIVINYL BENZENE

Tashkent UZBEKSKIY KHIMICHESKIY ZHURNAL in Russian No 1, Jan-Feb 82 (manuscript received 3 Jul 81) pp 48-49

KHASHIMOVA, S. M., DZHALILOV, A. T. and ASKAROV, M. A., Tashkent Order of Friendship of Nations Polytechnic Institute imeni Abu Raykhan Beruni

[Abstract] To improve thermal properties of polymers, the authors synthesized copolymers containing stabilizing links in the basic chain of macromolecules. The title compounds were combined by a suspension procedure; after swelling them in dimethylformamide, they were treated with a sodium salt solution of 2-mercaptobenzothiazole in dimethylformamide for 7 hours at 40° C. Their thermal properties were determined by dynamic thermogravimetric analysis, which showed that a slight amount of the sodium salt increased thermal stability and hastened emission of volatile products. 2% Antioxidant provided the best effects; higher quantities weakened the stabilizing effect, apparently because of thermal decomposition of the stabilizer. Figure 1; references 6: 4 Russian, 2 English.
[208-12131]

UDC 541.6

DEVELOPMENT OF RESEARCH IN HIGH-DURABILITY AND THERMAL RESISTANT POLYMERS FOR USE IN THE NATIONAL ECONOMY

Moscow VESTNIK AKADEMII NAUK SSSR in Russian No 1, Jan 82 pp 3-10

KOTON, M. M., director, Institute of High-Molecular Compounds, USSR Academy of Sciences

[Abstract] This article reviews Institute research in the areas of developing high-durability and thermal resistant polymers and finding practical uses for them, particularly in biology and medicine. Institute advances have included polymers that will retain their durability in a temperature range of -200 to 350° C. Flexible chain polymers were given added durability by new packing procedures that created crossed or parallel configurations of polyethylene and polypropylene with an essential 15-25% macromolecules for strength. Practical applications have been developed in collaboration with the "Plastpolimer" Scientific Production Association. Liquid crystal states have been utilized for durable films and fibers, with special success in synthesizing complex aromatic polyesters. Polyimides based on polypyromellitimides have been developed for many applications where heat resistance is essential. The Institute has also developed fusable polyarimides for producing coiled double-layered ductwork in a more economical way. Fabrics from polyimide fibers developed at the Institute are used for fireproof aircraft, ship and public building decor. In a discussion following Academician Koton's review of the Institute's work, other scholars stressed the combination of pure research and practical application that characterize its work.
[206-12131]

UDC 678.664.547.495,2 : (678.02 : 66.091)

SYNTHESIS AND PROPERTIES OF POLYURETHANE UREAS BASED ON OLIGOMERS WITH AMINO END GROUPS

Moscow KAUCHUK I REZINA in Russian No 4, Apr 82 (manuscript received 29 Oct 81) pp 7-10

MOROZOV, Yu, L., AL'TER, Yu. M. and PRIBYLOVA, L. M., Scientific Research Institute for Resins

[Abstract] Isocyanate oligomer forepolymers have been used as hardeners for durable polyurethane-urea products; the authors conducted detailed studies of the synthesis, structures and properties of these compounds with oligobutyleneglyco-urethane diisocyanate, oligopropyleneglycol-urethane diisocyanate, and oligobutadiene-urethane diisocyanate. Macrodiisocyanates were obtained by the reaction of oligoesterdiendioles with toluylene-2,4-diisocyanate. Results showed that properties of the polyurethane ureas depended on the molecular ratio of oligodiisocyanates and oligodiamines in any given test. The oligourethane diamines had commensurate flexible central and rigid-end polar blocks, in proportion to increases in oligodiisocyanate content. Further tests involved adding side methyl groups to polyester-urethane urea and polydiene-urethane urea at the flexible block, which reduced the polymers' durability. Temperatures above 50° C weakened bonds in the polymers, reducing durability again. Thus, the authors concluded that use of specific oligodiamines and oligodiisocyanates could result in obtaining polymers with desired physicomechanical properties. Figures 4; references 13: 11 Russian, (3 trans. from English), 2 English. [217-12131]

UDC 678.067: 677.529

PROSPECTS FOR APPLYING CONSTRUCTION CARBON PLASTICS IN NATIONAL ECONOMY

Moscow KHIMICHESKIYE VOLOKNA in Russian No 2, Mar-Apr 82 (manuscript received 6 May 81) pp 5-8

BUDNITSKIY, G. A., ZAKHAROV, A. V., SMIRNOV, V. S., MOLCHANOV, B. I. and CHUKALOVSKIY, P. A.

[Abstract] The authors reviewed developments in filling plastics with inorganic powder and fiber materials of various types to improve mechanical properties and durability, for use as construction materials. Hydrocarbons for this purpose provide high density and rigidity, low coefficients of linear thermal expansion and friction, durability, resistance to aggressive environments, and thermal and radiation factors, increased heat conductivity, and a range of electrophysical properties. These factors are compared to those of expensive steels and alloys, graphite and other metals, with the

conclusion that hydrocarbon plastics are feasible for use in aviation, defense and cosmic technology, automobiles and agricultural equipment. While the United States is the leader in such applications, in the Soviet Union advances are also being made to replace corrosion-resistant steels and non-ferrous metals with epoxy-hydrocarbon plastics and similar materials. Comparative advantages over metals and current applications of these plastics are listed. References 15: 5 Russian, 10 Western.
[209-12131]

UDC 677.494 : 677.862

PHYSICOCHEMICAL METHODS OF MODIFYING REINFORCING FIBER SURFACES

Moscow KHIMICHESKIYE VOLOKNA in Russian No 2, Mar-Apr 82
(manuscript received 19 Nov 80) pp 16-18

GAVRILYUK, N. N. and NOVIKOVA, O. A.

[Abstract] Since large use of polymer filaments to reinforce plastics is hampered by their low elasticity and heat resistance and insufficient adhesion, the authors studied polypropylene and polyformaldehyde threads with surfaces modified by a corona charge at 250V and 13.56 megaherz. The fibers were grafted to a methylmethacrylate monomer. Poor adhesion was attributed to low content of reactive centers on the surface and low surface energy. Graft polymerization of methylmethacrylate using post-polymerization was found to be less effective than direct radiation in methylmethacrylate vapor. Infra-red spectroscopy and weight methods determined that the best grafting came with beta-chloranthraquinone from benzene. Processing the polymers in an electrode-free charge eliminated a low-molecular surface layer which improved adhesion properties without changing the polymer's basic properties. Radiation improved surface properties of the polyformaldehyde thread. The corona charge, with 35 KV and thread motion of 10 meter/min, increased all physicomechanical and electrical properties of the organoplastic end product of the experiment. The modified threads were regarded to be promising reinforcing products. Figures 3; references 6: 4 Russian, 2 English.
[209-12131]

UDC 677.494.743.21-96

FIBER FROM FLUOROPLAST-40 (POLYFLUOROETHYLENE RESIN)

Moscow KHIMICHESKIYE VOLOKNA in Russian No 2, Mar-Apr 82
(manuscript received 3 Apr 81) pp 23-24

KRONFEL'D, A. M., PODLESSKAYA, N. K., KROLIKOVA, Ye. N., TARAKANOV, B. M., BEZPROZVANNYKH, A. V. and VOL'F, L. A.

[Abstract] Fluoroplast-40, with good dielectric properties, chemical resistance and radiation resistance, was extruded and the fibers and threads

produced evaluated in terms of flow, dye and orientational extraction characteristics. Several brands of the title compound were tested. A modifier was added consisting of 1-6% (mol) vinyl monomer containing fluoride, which increased thermal stability and stabilized the molten compound during formation. This allowed production of very fine threads. Optimal extraction temperature was 125-130°C. The fibers produced by thermal extraction showed significant changes in supermolecular structure, increased orientation and crystalline levels, and consequently, greater mechanical durability. The fluoroplast-40 fibers are recommended for filtering materials, anti-friction cables, reinforced plastics, medical sutures and other uses. Figures 2; references 4: 3 Russian, 1 French. [209-12131]

UDC [677.494.675 : 536.495].017.2/7

STABILITY AND THERMAL PROPERTIES OF UNTWISTED 'VNIIVLON' FIBER

Moscow KHIMICHESKIYE VOLOKNA in Russian No 2, Mar-Apr 82
(manuscript received 14 May 81) p 38

KHUDOSHEV, I. F., TSUMAN, E. P., LEVITES, L. M., KRASNYKH, L. F. and TOKAREV, A. V.

[Abstract] The chemical composition of "vniivlon" fiber is not given. The authors tested a 10 mm fiber which was being stretched at 10 mm/min, then heated it for 5 minutes at 250-450° C and stretched the heated fiber. Comparison of values at 50° intervals for 3 variations of the fiber indicate that all but one, rated 14.3 "tex", retained considerable stability up to 400° C. The 14.3 tex fiber was determined to have a defective initial structure. Above 400° C the fibers quickly lost stability. A test of pyrolytic stability showed the "vniivlon" fiber emits CO_2 at 200° and CO only at 350° C, both in insignificant amounts. Reference 1 (Russian). [209-12131]

UDC 541.64 : 547.538.141

KINETICS OF STYRENE COPOLYMERIZATION WITH METHYLMETHACRYLATE AT DEEP CONVERSION LEVELS

Kiev DOKLADY AKADEMII NAUK UKRAINSKOY SSR, SERIYA B: GEOLOGICHESKIYE, KHIMICHESKIYE I BIOLOGICHESKIYE NAUKI in Russian No 2, Feb 82
(manuscript received 19 Oct 81) pp 34-37

BELYAYEVA, L. S., ZAYTSEVA, V. V., ZAYTSEV, Yu. S. and KUCHER, R. V., academician, UkSSR Academy of Sciences, Institute of Physico-Organic Chemistry and Coal Chemistry, UkSSR Academy of Sciences; L'vov Polytechnical Institute

[Abstract] Previously (this journal, No 12, Dec 78), the authors reported the effects of depth of conversion on the process of radical copolymerization

of styrene with acrylonitrile. In the present study they consider kinetic parameters such as the general rate of the process, initial reaction speed and effectiveness, and constants of initiator decomposition and chain breakdown, relative to various starting monomer mixes of the title compounds. The copolymerization process was monitored by a gravimetric method at 75° C, with the rate of initiation measured by photoinhibition using n-butylnitrite. Changes in decomposition constant rates were studied relative to viscosity and polarity of the medium, with the result that such changes were attributed to trigger effectiveness. Increasing styrene content in the starting mix brought sharp changes in triggering rates. Changes in relative values for the initiation rate and the chain breakdown rate led to a practically uniform rate of copolymerization up to 30% conversion, while at 50% and above increased rates were dependent on chain growth reactions. Figures 3; references 10: 8 Russian, 2 English.
[215-12131]

UDC: 678.686.028:621.039.33

BINDER FOR RADIATION CURING OF REINFORCED PLASTICS

Moscow PLASTICHESKIYE MASSY in Russian No 5, May 82 pp 18-19

OMEL'CHENKO, S. I., SHLAPATSKAYA, V. V., VIDENINA, N. G., BOKALO, G. A. and BRATSLAVSKAYA, S. A.

[Abstract] A study is made of the results of radiation curing of new epoxy and phenol-formaldehyde binders, as well as acrylic epoxy binders distinguished by high radiation activity and reduced sensitivity to the inhibiting influence of oxygen. Studies were performed on epoxy oligomers with acid number 2-6 mg KOH/g obtained by partial or total esterification of aliphatic and aromatic epoxy oligomers with methacrylic acid in the presence of amine catalysts. IR spectroscopy and differential-thermal analysis were used to establish that acrylated aliphatic diepoxide type ADEG was most active in the process of thermal and radiation polymerization. A strengthening of the adhesion bonding between the filler and binder upon radiation curing was detected, indicating the advantages of this method of producing structural polymer materials. The method is considered both universal and promising. Figures 2.
[233-6508]

UDC: 678.686-138.32'21:66.095.3

CURING OF EPOXY-NOVOLAC BLOCK COPOLYMERS IN PRESENCE OF COORDINATION COMPLEXES OF ACETYL ACETONATES OF CERTAIN METALS

Moscow PLASTICHESKIYE MASSY in Russian No 5, May 82
(manuscript received 7 Jul 80) pp 20-21

SHUKLA, A. K., KARKOZOV, V. G., NIKOLAYEV, A. F. and VINOGRADOV, M. V.

[Abstract] Epoxy-novolac [soluble phenol-formaldehyde] block copolymers type 16E18N60-0.5 containing 40% ED-16 epoxy resin, 60% SF-010 novolac resin were studied. Nickel, cobalt and zinc diacetyl acetonates with pyridine, 2-methylpyridine and 4-methylpyridine were added, reducing the curing time by a factor of up to 15 or allowing it to be performed in 2 to 4 hours at 125 to 150°C. The reduction in curing time resulted from the joint influence of the metal acetyl acetonate and tertiary amine formed upon heating of the coordination complexes. References 5: 4 Russian, 1 Western.
[233-6508]

UDC: 678.675-416+678.766.44-416.01.004

THERMOSTABLE FILM AROMATIC POLYESTER AND POLYAMIDE MATERIALS

Moscow PLASTICHESKIYE MASSY in Russian No 5, May 82 pp 21-25

LOGUNOVA, V. I., BELYAYEV, I. S., NAUMOV, V. S., AKSENOVA, A. R., SOKOLOV, L. B., YAKUSEVA, N. N., DOMKIN, V. S., GERASIMOV, V. D. and MIKHAYLINA, V. M.

[Abstract] This review of the literature, including US and Japanese patents, describes some of the specifics of production methods and resulting properties of aromatic polyamide and polyarylate films which are of the greatest practical significance in manufacturing technology. The data are presented which would be needed to determine the areas of their application, which have not been adequately discussed in the literature. The films discussed are thermally stable, some up to 350-420°C, and have excellent insulating properties. They can be used for the manufacture of miniature capacitors and cable insulation. The films can be welded and glued to produce multilayer products. Machine insulation is an important area of application. Figures 5; references 15: 12 Russian, 1 Eastern European, 2 Western.
[233-6508]

UDC: 678.742.2-19.01

THERMAL STABILITY OF HPPE-BASED FLAME-RESISTANT COMPOSITES

Moscow PLASTICHESKIYE MASSY in Russian No 5, May 82 pp 32-33

NESMERCHUK, N. S., GILIM'YANOVA, D. S., SHED'KO, L. V., FEDEYEV, S. S., BALBATUNOVA, T. N., VAYNSHTEYN, A. B., ZARINYA, L. V. and KOROTKEVICH, S. Kh.

[Abstract] A study is made of the influence of various stabilizers and chloroparaffin quality on the thermal stability of composites made of high pressure polyethylene containing chloroparaffin and antimony trioxide as antipyrenes. Composites made with type 10703-020 HPPE with Sb_2O_3 and three specimens of chloroparaffin containing 70% chlorine were studied. The induction period of thermal destruction was determined at 160°C and 101324.7 Pa. Thermogravimetric analysis was performed on a derivatograph with a heating rate of 0.1°C/sec in air. Simultaneous use of a hydrogen chloride acceptor and an antioxidant was found to produce composites with good mechanical properties and long term resistance to thermal oxidative aging.
[233-6508]

UDC: 678.5-416.02(088.8)

THERMALLY STABLE POLYMER FILM PRODUCTION

Moscow PLASTICHESKIYE MASSY in Russian No 5, May 82 pp 39-41

AKSENOVA, A. R., ALEKSANDROVA, Yu. V. and VASIL'YEV, V. A.

[Abstract] Results are presented from a study of the literature, primarily patents, in the area of thermally stable film production technology for films made of aromatic polyamides, polyimides, polyamidoimides, polyamidoesters, polyarylates, polysulfones and polyhydantoins for use as electric insulating materials outside the USSR. Materials studied consists primarily of US, English and West German patents. The analysis showed that patents in the area of technologies for producing films of aromatic polyamides were granted exclusively to Japanese firms. US patents concern primarily the synthesis of polymers for thermally stable films, with less emphasis on production concern methods of synthesis of the polyamidoimides from various raw materials. All patents on polyarylate films describe simultaneous synthesis of the polymers and forming technologies. Thermally stable films based on aromatic polyamides and polyarylates as well as multilayer film products of these materials have been developed in the USSR. References 46: 6 Russian, 40 Western.
[233-6508]

UDC (678.743.41-678.742.2-139)541.15

EFFECT OF 'SKEPT-50' ON PROPERTIES OF RADIATION RESINS BASED ON 'SKF-26' FLUOROLATEX

Moscow KAUCHUK I REZINA in Russian No 4, Apr 82
(manuscript received 12 Jan 81) pp 15-17

SAMOYLENKO, T. G., "ZF NIIRP" [expansion unknown; perhaps "Trans-Caucasus Branch, Scientific Research Institute for Rubber Production??]

[Abstract] Radiation resins based on SKF-26 brand fluorolatex have high heat and corrosion resistance but poor low-temperature durability. Since high viscosity makes these resins hard to modify, the author mixed the title rubbers at temperatures below 50° C using rollers and adding 20 parts by weight of technical carbon and 5 parts of a sensitizer to reduce the optimum radiation dosage. The level of bonding was determined by the amount of swelling in acetone and carbon tetrachloride. The addition of SKEPT-50 reduced the mixture's viscosity and temperature brittle mess. Maximum swelling came with addition of 90 parts SKEPT-50. Improved low-temperature reduction of SKEPT-50 + SKF resins came only with unincubated variants. The author concludes that reducing the brittle temperature and viscosity of the resins studied is related to plastification. Improved durability of the mixtures is related to structural transformations during incubation, and cross-linking is tied to the globular structure of SKF-26. Figures 5; references 9 (Russian).
[217-12131]

UDC 678.049.13

ESTERS OF 2-DIHYDRODICYCLOPENTADIENYL-2-ALKYLACETIC ACIDS AS EFFECTIVE NEW PLASTIFIERS FOR RESIN MIXTURES

Moscow KAUCHUK I REZINA in Russian No 4, Apr 82
(manuscript received 21 Jan 81) pp 25-26

ZEYNALOV, B. K., ABASOVA, R. L., SHAGIDANOV, E. N. and ISKENDEROVA, S. A., Institute of Petrochemical Processes, AzSSR Academy of Sciences

[Abstract] In seeking plastifiers for butadiene-nitrile rubbers that would produce high durability, deformacion and plastic properties, the authors tested complex esters of the title acids, which are of low cost and readily available and which allow use of a simple process. They found that the plasticity of resin mixtures containing dicyclopentadiene esters was 2-3 times higher than those made with dibutylphthalate. A similar result was found for durability, and in both cases added amounts of the esters further increased the values. The test resins were more elastic and less subject to aging and swelling in organic solvents. References 5 (Russian-1 trans. from English).
[217-12131]

UDC 678.063.3 : 678

EFFECTS OF FILLER AND CHEMICAL MODIFIER TYPES ON ELASTIC VISCOSITY PROPERTIES OF RESIN MIXTURES

Moscow KAUCHUK I REZINA in Russian No 4, Apr 82
(manuscript received 2 Apr 81) pp 28-30

KOKOREVA, O. A., SHVARTS, A. G. and YEVSTRATOV, V. F., Moscow Institute of Precision Chemical Technology imeni M. V. Lomonosov; Scientific Research Institute of the Tire Industry

[Abstract] Chemical modification during mixing can control properties of synthetic rubbers, partially by the reactions between elastomers and between elastomer and filler. The dependence of viscosity on filler quantities, expressed in formulas by Guth and Einstein (separately), was tested. The formulas were shown to be applicable where inactive fillers such as chalk were used, but with chemically-active fillers both the quantity of filler and the nature of their reactions had to be considered: the more active the filler, the larger the amount of initial elastomer entering a rigid phase. Use of "RU-1" and hexachloroparaxylene as modifying agents brought a divergence from theoretical values for the dependence of viscosity on filler quantity, with higher viscosity increases when more than 15 parts by weight of technical carbon were added. This increase is explained by the prevalence of the rubber structuring effect. Figures 3; references 9: 5 Russian, 4 English.
[217-12131]

UDC: 678.762:678.01.54

HIGH MOLECULAR ANTIOXIDANT PRODUCED BY MODIFYING PREPOLYMER CONTAINING TERMINAL ISOCYANATE GROUPS WITH β-(4-OXY-3,5-DITERT-BUTYLPHENYL)-PROPIONIC ACID

Leningrad ZHURNAL PRIKLADNOY KHIMII in Russian Vol 55, No 4, Apr 82
(manuscript received 19 Nov 80) pp 884-889

DOMNINA, N. S., GOROKHOVA, L. S. and SHAGOV, V. S., Leningrad State University imeni A. A. Zhdanov

[Abstract] A study is made of the possibility of synthesizing high molecular antioxidants by modifying a prepolymer with terminal isocyanate groups with β-(4-oxy-3,5-ditert-butylphenyl)-propionic acid. Commercial FP-65, a copolymer of butadiene (80%) and isoprene (20%) with terminal isocyanate groups was subjected to chemical modification. The reaction was conducted in xylene in an atmosphere of argon at 130°C for 12 hours. After 7 hours the reaction system contained no more isocyanate groups. The modified prepolymer was tested as an antioxidant for stabilization of SKD raw rubber. The tests showed that its effectiveness had been doubled. The yield of the attached product in the reaction can be increased to 75% by heating the reaction mixture to 130°C for 5 hours after consumption of the isocyanate and carboxyl groups is complete. The end product is equal to or superior to the commercial low-molecular-weight antioxidant ionol. The new product, called VAO-KF, can provide effective protection from oxidation for rubber to be used under severe conditions. Figures 5; references 8: 6 Russian, 2 Western.
[232-6508]

UDC: 628.35:630*863.5

BIOCHEMICAL WASTE WATER PURIFICATION AT THE NIKOLAYEVO HYDROLYSIS AND FERMENTATION PLANT

Moscow GIDROLIZNAYA I LESOKHIMICHESKAYA PROMYSHLENNOST' in Russian No 3, 1982 (signed to press 9 Apr 82) pp 25-26

NAZAROVA, N. S., GOLOVKO, G. P., ZATULA, V. V., ZINCHENKO, I. V., Khar'kov Department, All-Union Scientific Research Institute of Water Supply, Sewer Systems, Hydraulic Engineering Structures and Engineering Hydrogeology, Khar'kov Division; SHINOV, Yu. I., FORSOV, V. I., KHOMIK, A. I. and CHIKISHEVA, L. I., Nikolayevo Hydrolysis-Yeast Plant

[Abstract] The Khar'kov Division has developed a method of biochemical purification of waste water to remove organic compounds by treatment with azotobacter chroococcum, a nitrogen-fixing microorganism, and baccilus megaterium var. phosphaticum, which decomposes organophosphates. The process is performed with or without activated silt, and allows purification of waste waters from acetone and hydrolysis plants. The method has been introduced at the Nikolayevo Plant, achieving a savings of over 68,000 rubles per year. References 4: 3 Russian, 1 Western.
[234-6508]

UDC 628.165:532.711

FORMATION OF DYNAMIC IRON HYDROXIDE MEMBRANE AND ITS DEMINERALIZING CAPACITY

Kiev KHIMIYA I TEKHNOLOGIYA VODY in Russian Vol 3, No 5, Sep-Oct 81 (manuscript received 5 Dec 80) pp 402-405

BADEKHA, V. P., TSAPYUK, Ye. A. and KUCHERUK, D. D., Institute of Colloid Chemistry and Water Chemistry imeni A. V. Dumanskiy, UkSSR Academy of Sciences, Kiev

[Abstract] The effect of physical chemical properties on the formation of a dynamic iron (Fe III) hydroxide membrane was studied in a reverse osmosis

flow type cell, using 48 nm pore size YAM-500 ultrafilters. Measurement of membrane formation kinetics indicated that after initial filtration, with pore occlusion, a transition to filtration with sedimentation occurs, at about 0.015 kg additive per m^2 of filter support. The process of membrane formation follows the equations of the theory of convective filtration. Microscopy was used to establish that the minimum membrane thickness for sodium retention was 0.1 mm. Particle coagulation above pH 5.6 and dissolution below pH 2 were demonstrated electrophoretically. With increasing pressure ion retention of the membrane decreased, as expected for incompressible particles. The low selectivity of the membrane is connected with high concentration polarization. At low pressure maximal salt retention was seen at pH 3.5-4, corresponding to high particle charge. When the pH of the initial solution was less than 3.7 permeability decreased and selectivity increased, suggesting a change in particle structure. Figures 4; references 8: 6 Russian, 2 Western.
[39-12126]

MISCELLANEOUS

INFLUENCE OF ATOMIC HYDROGEN IMPURITIES ON SEMICONDUCTOR CHARACTERISTICS

Moscow SOTSIALISTICHESKAYA INDUSTRIYA in Russian 29 May 82 p 2

[Article: "Hydrogen and Semiconductors"]

> [Text] Soviet scientists have made a scientific discovery in solid state physics and in the physics of semiconductors. Yesterday it was registered with the USSR State Commission for Inventions and Discoveries.

The properties of semiconductor crystals are known to change radically when various impurities are introduced into them. This is precisely the basis of obtaining semiconductors with prescribed parameters.

Within the broad class of impurities, hydrogen remained a question mark for a long period of time. The traditional research methods of solid state physics were found to be unable to explain the role of hydrogen atoms in semiconductors. But this problem, one of importance to science and technology, required solution because hydrogen is broadly employed in different stages of making semiconductor materials. Using the methods of nuclear physics in a fundamental research effort, the authors clarified the physical picture of hydrogen's behavior in semiconductor crystals and established why its atoms could not influence the electric properties of these materials. Their conclusions were confirmed experimentally by other groups of researchers in leading scientific centers of our country, of the USA and Switzerland.

The authors' discovery laid the basis for further development of the theoretical concepts on so-called impurity centers in semiconductors. The significance of the results lies in the fact that the discovered properties of hydrogen will be accounted for in the creation of new processes for growing semiconductor crystals. In the future it may become possible to use atomic hydrogen impurities in semiconductors to develop sensors picking up high energy emissions.

This discovery, which shed light on the form in which hydrogen and other single-electron atoms exist in the crystalline lattice of semiconductors, was made by colleagues of the Institute of Theoretical and Experimental Physics Ye. V. Minaychev, G. G. Myasishcheva, Yu. V. Obukhov and G. I. Savel'yev, Doctor of Chemical Sciences V. G. Firsov, by colleagues of the State Scientific Research and Planning Institute of Rare Metals Industry ("Giredmet") Candidate of Physicomathematical Sciences D. G. Andrianov and Doctor of Physical Mathematical Sciences V. I. Fistul, and by V. S. Roganov of the Combined Institute of Nuclear Research (Dubna).

11004
CSO: 1841/239

UDC 621.378.33

CHEMICAL LASER BASED ON PHOTOCHEMICAL REACTION OF FORMALDEHYDE WITH CHLORINE

Moscow KINETIKA I KATALIZ in Russian Vol 23, No 2, Mar-Apr 82
(manuscript received 22 Oct 80) pp 311-314

BOKUN, V. Ch. and SOTNICHENKO, S. A., Chernogolovka Department,
Institute of Chemical Physics, USSR Academy of Sciences

[Abstract] The authors sought to improve the efficiency of chemical lasers, which suffer from a slow endothermal chain reaction, by using formaldehyde with halogens or halogen-containing compounds. After determining that the mixture of $H_2CO + Cl_2$ was chemically feasible, the authors used standard chemical laser equipment with photo-iniated reaction of a $H_2CO : Cl_2 = 1 : 10$ mixture at 10 mm mercury pressure. Photodissociation was found to play no important role in laser generation. Doubling the critical pressure of H_2CO broke off the generation when CO_2 was added, apparently due to the lower generation threshold of CO_2 and the slower relaxation rate of CO_2 (00°1) on the laser mixture molecules. A qualitative study of laser generation with other halogens showed that generation would also take place on HCl and HF molecules, with the latter having more energy radiation. Figures 3; references 13: 2 Russian, 11 English.
[219-12131]

CSO: 1841

- END -

JPRS 81653

27 August 1982

USSR Report

CHEMISTRY

No. 90

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27 August 1982

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NEW AEROSOL PEST CONTROL METHOD DEVELOPED

Moscow SOTSIALISTICHESKAYA INDUSTRIYA in Russian 16 Jun 82 p 2

[Article: "Help From an Aerosol"]

[Text] A scientific-production detachment of aerosol plant protection workers has been sent from Novosibirsk to Kazakhstan. Using a new method developed by the Institute of Chemical Kinetics and Combustion, Siberian Department, USSR Academy of Sciences, the specialists will begin a fight against farm pests over large areas of virgin land.

"The principle behind our procedure is something we have all come across in our daily lives many times," explained the group leader, V. Sakharov. "It has been noted, for example, that when it is foggy, a person's hair quickly gets wet. This property particles have for selectively 'sticking' to objects of different dimensions and shapes was utilized in our design of an air flow generator used to spray chemical preparations. We experimentally selected the dimensions of particles capable of settling on some species of flying and crawling insects. Agricultural crop pests perish quickly in such a cloud. Moreover environmental contamination is much lower than with treatment of fields by aircraft spraying of toxic chemicals."

Novosibirsk scientists will carry this new procedure to different agricultural zones of the country in the present five-year plan. Forestry specialists are interested in it as well. The first aerosol protection detachment of their sector has been created in the Bashkir ASSR.

11004
CSO: 1841/261

UDC 541.18.2/3

DIFFUSION PRECIPITATION OF AEROSOLS IN MODEL FILTER AT LOW PECLET NUMBERS

Moscow ZHURNAL FIZICHESKOY KHIMII in Russian Vol 56, No 5, May 82
(manuscript received 11 Jun 81) pp 1304-1305

CHECHUYEV, P. V. and KIRSH, A. A., Scientific Research Physico-Chemical
Institute imeni L. Ya. Karpov, Moscow

[Abstract] The title precipitation is of interest in studying gas and vapor adsorption by fibers and trapping products of the disintegration of radioactive inert gases, as well as in studies of gas filtration by fiber filters of less than 10^{-5} cm diameter fibers. The authors measured the trapping coefficient in parallel cylinders at low Peclet numbers as it approaches its extreme limit. Parallel 8.9 mcm fibers spaced at 66.8 mcm formed a filter 0.485 cm^2. Sodium chloride particles with average 15-100 Å diameter were transmitted as the aerosol through a measuring channel containing several fibers and through a control channel or equalizer with a single screen for speed control. Experimental results coincided with theoretical projections for Peclet numbers to 0.5, and are described as $\eta = 2.9\ k^{-1/3} Pe^{-2/3}$.
Figure 1; references 3 (Russian).
[249-12131]

ANALYTICAL CHEMISTRY

UDC 543.544.2 : 543.38

IDENTIFYING ISOMERIZING ORGANIC COMPOUNDS IN INDUSTRIAL SEWAGE

Kiev KHIMIYA I TEKHNOLOGIYA VODY in Russian Vol 4, No 2, Mar-Apr 82
(manuscript received 8 Oct 81) pp 151-153

KERZHNER, B. K., VRUBEL', T. L. and KOFANOV, V. I., Institute of Colloid and Water Chemistry imeni A. V. Dumanskiy, UkSSR Academy of Sciences, Kiev

[Abstract] Widely used chromatographic methods for analyzing organic wastes in sewage require various independent spectral methods and mass spectrometry due to the lack of standards. The authors propose a new approach based on the phenomenon of photoisomerization and two-dimensional chromatography. Since activation energy of cis-trans-isomerization is generally higher than in tautomeric conversions, the mixtures of cis-trans-isomers separate and show up on the chromatograms. The hypothesis was tested on dibutyl ester of ethylene carbonic acid, trans-stilbene, trans-azobenzene and trans-azoxybenzene, with corresponding cis-isomers obtained by irradiating the solutions with ultraviolet light. The method was successful in identifying photoisomerization of the compounds listed when they were adsorbed on silica gel. Figure 1; references 4: 1 Russian, 3 Western.
[223-12131]

UDC 628.312 : 542.87

APPLYING REDOX-METRY TO EVALUATING POLLUTION OF CITY SEWAGE

Kiev KHIMIYA I TEKHNOLOGIYA VODY in Russian Vol 4, No 2, Mar-Apr 82
(manuscript received 25 Sep 81) pp 153-156

KOLBASOV, G. I., KRUNCHAK, V. G., NIKOLAYEV, A. N. and NAUMOV, A. V., All-Union Scientific Research Technological Institute of Antibiotics and Enzymes for Medicinal Use, Leningrad

[Abstract] Chemical and biological consumption of oxygen are basic parameters for measuring the quality of city sewage water. The authors studied the possibility of using the redox-metry method to determine water purification capacity needs for the Leningrad water supply. The oxidation and

reduction system used was potassium ferri-ferrocyanide- $K_3Fe(CN)_6+K_4Fe(CN)_6$. The authors measured pH and concentrations of oxidised and reduced forms. Despite the wide variations in sewage water conditions, the authors identified a parameter for purification, E_t, which correlated well with chemical oxygen consumption data determined by the bichromatic method and could also be used to evaluate biological oxygen consumption. The method is simple and requires no elaborate equipment. Figures 3; references 7 (Russian).
[223-12131]

UDC 621.355.1

ANALYSIS OF BARODYNAMIC CURVES IN CHARGING NICKEL-HYDROGEN BATTERIES

Moscow ELEKTROKHIMIYA in Russian Vol 18, No 5, May 82 (manuscript received 19 Mar 79) pp 643-644

MOLOCHNIK, T. A. and TSENTER, B. I., All-Union Scientific Research Institute for Batteries, Leningrad

[Abstract] Data indicate that at initial stages of charging nickel-hydrogen batteries hydrogen is produced on the hydrogen electrode; as the capacity of the nickel oxide electrode is exhausted oxygen is generated, which then ionizes on the hydrogen electrode. At one extreme, where oxygen ionization is equal to the charge current, a stationary state is achieved where pressure does not change. At the other extreme, oxygen is generated without ionization. Internal pressure above the stoichiometric level is compensated by a reduced pressure within the system related to the oxygen ionization. The linear pressure-capacity curve must be accompanied by a lack of battery heating during charging to determine the absence of gaseous oxygen. Figure 1; references 3: 2 Russian, 1 English.
[242-12131]

UDC 542.61 : 543.70

EXTRACTION-PHOTOMETRIC DETERMINATION OF URANIUM(VI) BY 8-HYDROXYQUINOLINE AND BUTYLRHODAMINE

Moscow ZHURNAL ANALITICHESKOY KHIMII in Russian Vol 37, No 5, May 82 (manuscript received 11 May 81) pp 855-861

ALIMARIN, I. P., GOLOVINA, A. P. and RUNOV, V. K., Moscow State University imeni M. V. Lomonosov

[Abstract] Uranium(VI) content has long been determined by toluene or benzene extraction of ion associates that contain anion chelates and basic dyes, using relatively selective but insensitive methods. The authors

studied the possibility of combing previously concentrated U^{VI} by 8-hydroxyquinoline extraction with determination of the element in the organic phase in the ion-associate form using butylrhodamine. The Box-Wilson mathematical planning method was used to determine optimal conditions of extraction photometry in pure U^{VI} salts, in monazite sand and sea water. In the latter two locations, the uranium was first concentrated in the presence of EDTA with 0.5 solution of 8-hydroxyquinoline, then determined as an ion associate with ButRh. Since early variants of the test had poor replication, adjustments were made that provided improvement by a factor of 7. The method also permitted determination of pH, 8-hydroxyquinoline concentration, butylrhodamine content and their effects when reacting. In the presence of EDTA, uranium(VI) determination was not hampered by 5000 times its quantity of Ni, Mn^{II} or copper, or 1000 times its quantity of lanthanoids, Th or Fe^{III}. The assay was equal to previous methods at the lowest level of detection and better than them in selectivity. Figures 3; references 11 (Russian).
[250-12131]

UDC 543.544 : 546.131 : 543.847

SELECTIVITY OF THERMOIONIC DETECTOR

Moscow ZHURNAL ANALITICHESKOY KHIMII in Russian Vol 37, No 5, May 82
(manuscript received 20 Apr 81) pp 887-889

DEVYATYKH, G. G., KRYLOV, V. A., MAKAROV, V. Ye. and VTOROV, B. G., Institute of Chemistry, USSR Academy of Sciences, Gor'kiy

[Abstract] Thanks to its use of small samples and high accuracy, gas chromatography has wide application, but high sensitivity to compounds containing chlorine, phosphorus, silicon, germanium and arsenic interfere with identifying small concentrations. The authors tested the selectivity of a method for analyzing inorganic chlorides using a thermoionic detector based on a chromatographic device equipped for analyzing substances that readily hydrolize and are aggressive. Necessary equipment adaptations and chemical procedures are presented in the experimental section. The device covered more than 3 orders in its range, and had high sensitivity to inorganic substances containing phosphorus, which surpassed its sensitivity to chlorides of other elements by a factor of 2-4. The detector was more stable in operation and could detect phosphorus trichloride and oxychlorides to a lower limit of $3\cdot 10^{-6}$%. Figures 3; references 5 (Russian).
[250-12131]

ALGAE USED AS ANIMAL FEED ADDITIVE

Moscow SOTSIALISTICHESKAYA INDUSTRIYA in Russian 20 Jun 82 p 2

[Article by V. Proskura: "Experience Finds Successors"]

[Text] The Baltic's first agroindustrial operation producing *Chlorella* suspension has been created near Riga. It is being supplied to the neighboring "Kekava" Experimental-Demonstration Poultry Factory.

Unicellular algae called *Chlorella* cover local water basins in summer. Experiments by Latvian scientists confirmed that the biological activity of these algae has no competitors within the plant world of the region. When added to the feed ration, these specially processed microscopic plants produce substantial weight gains in animals and birds, and especially in broilers.

The experience of "Kekava" is now being disseminated successfully among other agroindustrial complexes in the republic, where concentrated feed additive shops are also being created.

11004
CSO: 1841/261

UDC 615.276 : 547.564.4

AMINO ACIDS AS AMINE COMPONENTS IN MANNICH REACTIONS

Moscow USPEKHI KHIMII in Russian Vol 51, No 4, Apr 82 pp 678-695

AGABABYAN, A. G., GEVORGYAN, G. A., and MNDZHOYAN, O. L., Institute of Fine Organic Chemistry imeni A. L. Mndzhoyan, ArSSR Academy of Sciences, Yerevan

[Abstract] Aminomethylation by the Mannich method involves substrata condensation with at least one active hydrogen atom and formaldehyde, and primary or secondary amines or ammonia. A wide selection of reagents and the mild conditions make the Mannich reaction very important, but aminomethylation by amino acids has received little attention. The authors review compounds produced by such reactions as used in medicine for antiphlogistic, fever reducing, spasmolytic, adrenolytic, H-cholinolytic and analgesic properties. Aminomethylation of CH-acidic components, e.g., phenols, produced both usual derivatives and polymers with benzene nuclei bound by methylene groups. With NH-acidic components, such combinations as amine-formaldehydeamide and amine-formaldehyde-guanidine reacting in neutral and acid media are discussed. For example, tetracycline aminomethylation with glycine, alpha-alanine, phenylalanine, ornithine and arginine produces monoaminomethyltetracyclines. With PH-acidic components, the Mannich reaction may produce N-phosphonomethylglycines. The biological properties of alpha-amino acid derivatives of Mannich reactions have high bactericidal activity, and can be used against Gram-positive and Gram-negative microorganisms in the textile and paper industries. The hydrochloride of the ethyl ester of N-[beta-isobutoxybenzoyl] glycine was an effective antiphlogistic and fever-reducing agent without great toxicity. Three compounds of N-[beta-(alkoxybenzoyl)ethyl]glycines showed some promise in treating Ehrlich's adenocarcinoma. N-phosphonomethylglycines have been shown to be highly effective pesticides and plant growth regulators.
References 132: 20 Russian, 112 Western.
[226-12131]

UDC 547.963

REACTIONS OF METALS AND PROTEINS

Moscow USPEKHI KHIMII in Russian Vol 51, No 4, Apr 82 pp 696-711

BEZRUKOV, M. G., BELOUSOVA, A. M. and SERGEYEV, V. A., Institute of Elemental Heteroorganic Compounds imeni A. N. Nesmeyanov, USSR Academy of Sciences, Moscow

[Abstract] The authors review the literature on various types of metal-protein reactions and evaluate the role of metals at different levels of protein organization. Biological functions and types of reactions in metal-protein systems include the presence of Mn(II) ions in arginase and of Zn(II) ions in carboznhydrase, redox proteins involved in nitrogen fixing, mitochrondria breathing, etc., and carrier proteins such as transferrin, hemoglobin and others. Intermediary, hydrophobic and ligand reactions, heavy metal combination with protein molecules, and supermolecular compounds forming reserve proteins such as ferritine, produce several types of metal-protein biological compounds. Bonding of metals by functional protein groups differs sharply from the bonding of the same metals in peptides and amino acids, where there is a cooperative nature to the reaction. Consideration of hard and soft acids and bases makes it possible to predict the relative durability of metal-protein coordination bonds. Useful results in this area have been achieved by study of copper and ribonuclease, which has determined the coordination of Cu(II) with functional groups of amino acids of ribonuclease residue. Studies of the effects of metals on various levels of protein organization, such as for collagen, have shown that the dependence of enzyme catalytic activities on metal cations is a sensitive indicator of tertiary changes in protein structure. Zinc reacts with insulin to form hexamer aggregations and slows the latter's absorption. Practical applications of metal-protein compounds include use to precipitate protein from solutions, use in electron microscopes, food preservation and medicine. Figures 5; references 132: 13 Russian, 119 Western.
[226-12131]

UDC 541.64 : 576.2

PHYSIOLOGICALLY ACTIVE POLYMERS AND MACROMOLECULAR THERAPEUTIC SYSTEMS

Moscow VYSOKOMOLEKULYARNYYE SOYEDINENIYA in Russian Vol 24, No 4, Apr 82 (manuscript received 6 Aug 80) pp 675-695

PLATE, N. A. and VASIL'YEV, A. Ye., Moscow State University imeni M. V. Lomonosov; Branch for Preparation of Finished Pharmaceuticals, Scientific Research Institute for Biological Testing of Chemical Compounds

[Abstract] The authors review biomedical uses of polymers, beginning with biologically-tolerated endoprostheses and ancient herbal medications and

continuing with, and concentrating on, modern uses both as direct synthetic medications and as time-release substances for regulating the effects of other medications. Unique medical preparation include antisilicotic and antiheparin medications in the four groups of neutral polymers, polycations, polyanions and others. Polymers with bound iodine have high bactericidal action with low toxicity. Water-soluble grafted polymers determine physicochemical properties of certain medications consisting of enzymes or other proteins, and reduce the latters' antigen action. These polymers can also alter membrane-penetration features, thus controlling the rate of medication delivery. Most medicinal polymers synthesized to date have intracellular action. The chief problem in targeting medicinal polymers is the creation of in vivo conditions for affine chromatography: another difficulty lies in assuring penetration of cell walls, and in this characteristic medicinal polymers are far superior to previously used low-molecular medications. Various biopolymers and derivatives, complex-chain and carbon-chain polymers are discussed. Corpuscular microparticles and microspheres, macromolecular therapeutic systems placed within the body and ones unconsciously distributed, diffusion by concentration variation, and osmotic pressure diffusion are also discussed. Figures 8; references 133: 46 Russian, 87 Western.
[228-12131]

CATALYSIS

UDC [546.814 + 546.865] - 31 : 66.094.37 : 573.31

ELECTRICAL PROPERTIES OF LEAD-ANTIMONY OXIDE CATALYSTS

Moscow ZHURNAL FIZICHESKOY KHIMII in Russian Vol 56, No 5, May 82
(manuscript received 21 Apr 80) pp 1133-1135

LEMBERANSKIY, R. A., ANNENKOVA, I. B. and LIBERMAN, Ye. S., Azerbaijan
Institute of Petroleum and Chemistry imeni M. Azizbekov, Baku

[Abstract] Previously the authors studied the phase composition and catalytic properties of lead-antimony oxide contacts and attempted to explain their activity in partial olefin oxidation by the formation of solid solutions in the lead-antimony oxide system. In the present study, they treat electrical properties of those oxides seeking correlations with other physicochemical properties. After synthesizing samples, the authors measured electrical conductivity in a constant current by a sounding method, with thermo-electromotive force and the direction of electrical conductivity changes in the oxidizing and reducing media determining the type of conductivity. At room temperature, lead dioxide and lead-antimony catalysts were judged to be n-semiconductors. The type of conductivity of SnO_2 did not change under catalyzing conditions. At high temperatures the tested binary catalysts behaved like p-semiconductors: in an oxidizing atmosphere their conductivity grew, but in the presence of gaseous isobutylene it decreased. This was apparently caused by the presence of Sb_2O_4. Up to 10% by atmosphere, introducing antimony into SnO_2 rapidly increased its electrical conductivity, while higher amounts decreased it. The experiments showed that the electrical conductivity of binary catalysts is characterized by a low temperature coefficient and relatively little dependence on the nature of the reactive medium. Figures 2; references 7: 5 Russian, 2 English.
[249-12131]

SOCIALIST COMPETITION TERMS CALLED UNFAIR

Moscow SOTSIALISTICHESKAYA INDUSTRIYA in Russian 15 Jun 82 p 2

[Article by V. Tarkhov, director, Synthetic Alcohol Plant, V. Gelis, chairman, trade union committee, and A. Sorokin, chief, division of economic planning: "No Matter How Hard you Try..."]

[Text] Once five enterprises of the USSR Ministry of Petroleum Refining and Petrochemical Industry in Kuybyshevskaya Oblast were grouped together into the "Kuybyshevnefteorgsintez" Production Association. Two of them--the Syzran' and Kuybyshev petroleum refineries--retained their legal independence, while three--the Novokuybyshevsk Petroleum Refinery, our synthetic alcohol plant and a machinery and repair plant--were given the status of production units.

Concentration of production and improvement of the management structure were the will of the times. But the practical work of the production collectives within the association revealed one serious shortcoming.

Socialist competition is known to play a role in raising labor productivity, improving production and increasing its effectiveness. Now everyone understands the influence of moral and material stimuli upon development of labor rivalry. A valid assessment of the results of the activities of a single person and the whole collective is the best stimulus of enthusiasm in work. But it is precisely here that the collectives of the "production units" found themselves in a strange situation. The problem is that since 1976 they have been deprived of the right to participate on their own in the all-union socialist competition by a decision of the Central Committee of the Trade Union of Workers of Chemical and Petrochemical Industry and the Ministry of Petroleum Refining and Petrochemical Industry. Our successes can be rewarded only if the production association as a whole is awarded a winning place.

So what happens? While in the 21 quarters for which the association has existed the independent enterprises--the Syzran' and Kuybyshev oil refineries--have earned prizewinning places in the all-union socialist competition many times among the sector's enterprises, and they have won Red Banners and prizes, the association as a whole has only managed to do so three times. Consequently we, the workers of the "production units," could be rewarded for good work that many times as well.

Moreover when our collectives do receive prizes, their dimensions (calculated per worker) are significantly lower. Last time, the association allocated us a bonus totaling 15,490 rubles, while were the plant an independent unit, it would have qualified for almost 30,000 rubles. The discrepancy is a little too great.

The association's executives are not to blame for this. There is a statute according to which the dimensions of prizes paid to winners of a competition, calculated on a per-worker basis, are decreased as the number of winning collectives increases (the upper limit is 10 rubles, and the lower limit is 2 rubles 50 kopecks). But in this case the collectives of legally independent enterprises are in more advantageous conditions than we. After all, our prize is only part of the reward given to the large association.

There is no way all of this can be explained to laborers who are working in the former conditions but are now being rewarded worse. Thus we find that no matter how hard we try, we do not get recognition if our other partners in the association let us down.

Recently we were visited by colleagues from the Chemical Plant imeni 50-Letiye SSSR in Groznyy. This enterprise, which had once been independent, was also reorganized into a "production unit." Before, this collective was famous throughout the country: It won prizewinning places in the all-union socialist competition 52 times. But now it also has been "excommunicated" from the competition.

The executives of the association and of the "production units" wrote the central committee of the sector's trade union and the ministry about all of this many times with the hope of making some changes in the terms of the competition. All the more so because the decree "On the All-Union Socialist Competition for Successful Fulfillment and Overfulfillment of the Quotas of the 11th Five-Year Plan," adopted by the CPSU Central Committee, the USSR Council of Ministers, the AUCCTU and the Komsomol Central Committee, states directly: As with all other enterprises, an association's "production units" can be awarded perpetual Red Banners--that is, they may be direct participants of the all-union competition. But the changes never followed. Then V. Semenov, a machine operator of the Novokuybyshevsk Petroleum Refinery, brought this problem up for discussion by participants of a congress of the sector's trade union.

It was with a sense of bewilderment that we read the reply to Semenov's statement, given by the chairman of the central committee of the sector's trade union, G. Sukhoruchenkov. It states that according to the terms of the all-union socialist competition among collectives of the production associations, enterprises and organizations of the Ministry of Petroleum Refining and Petrochemical Industry, "production units" and independent enterprises contained within an association compete within the framework of the association on the basis of its conditions, and that they do not compete independently in a sector competition.

This reply was signed 25 January 1982. But the competition terms it refers to were repealed on 25 August 1981 by a joint decision of the USSR Ministry of Petroleum Refining and Petrochemical Industry and that same trade union central committee. Nor is there any truth in the assertion that independent enterprises do not participate in sector competitions.

We would like to recall the contents of a directive letter from the USSR Ministry of Petroleum Refining and Petrochemical Industry and the central committee of the sector's trade union dated 6 May 1978, "On Establishing the Dimensions of Money Prizes Paid as Rewards to Collectives Winning the All-Union Socialist Competition," which has never been rapealed by anyone and which was published on the basis of a corresponding decree of the USSR State Committee for Labor and Social Problems and the Presidium of the AUCCTU. According to this document, we are equal participants in the sector competition. However, we are no longer even being told of the terms of the competition of the sector's enterprises.

We believe this to be an abnormal situation. Any reorganization of production management should not suffocate but develop the labor rivalry of production collectives, no matter what name is given to them.

11004
CSO: 1841/261

BRIEFS

ETHYLENE STORAGE--Plastics production will be started at one of East Siberia's largest chemical plants presently under construction near the city of Zima. It is now producing chlorine from out of a highly rich deposit of rock salt lying in the earth as seams up to 80 meters thick. But the plant will also need ethylene to obtain its principal product. It will be supplied to the plant by the "Angarsknefteorgsintez" Production Association. A 217-kilometer gas main has already been laid from Angarsk to Zima. Construction of a unique ethylene storage facility has now begun at the end of this route. [By Yu. Levitskiy, Irkutskaya Oblast] [Text] [Moscow SOVETSKAYA ROSSIYA in Russian 23 May 82 p 1] 11004

DIETHYLBENZENE PRODUCTION--A new product, high quality diethylbenzene, has been obtained at the Cherepovets Nitrogen Fertilizer Plant. It has no equals in the country in terms of its technical characteristics. Diethylbenzene has broad application today--from metallurgy to medicine. With its help, useful substances can be extracted from sea water, and medical industry will have the capability for creating an artificial kidney. [By V. Minin, Cherepovets] [Text] [Moscow SOTSIALISTICHESKAYA INDUSTRIYA in Russian 20 Jun 82 p 2] 11004

CSO: 1841/261

ACADEMY'S SIBERIAN DEPARTMENT DESCRIBES RESEARCH PROGRAM

Moscow ZNANIYE-SILA in Russian No 5, May 82 pp 1-3, 29

[Interview with Academician V. A. Koptyug by correspondents M. Kuryachey and M. Adzhiyev: "Siberian Acceleration: Science and Practice"]

> [Excerpts] Twenty-five years ago a new scientific center was created not far from Novosibirsk--the Siberian Department of the USSR Academy of Sciences. During this time the department has successfully handled continually growing national economic tasks, and the center's scientists have made a substantial contribution to developing fundamental scientific problems. An interview conducted by our correspondents M. Kuryachey and M. Adzhiyev with the chairman of the Presidium of the Siberian Department of the USSR Academy of Sciences, Academician V. A. Koptyug, was devoted to the grandiose transformations of Siberia and to the role the department is playing in the enormous amount of work going on now and still to do.

[Answer] Siberia is a gigantic territory occupying tens of millions of square kilometers. Almost 40 percent of the area of the entire Soviet Union! And in the 20 years of its existence the Siberian Department has been methodically developing these enormous regions, creating its own institutes, divisions and laboratories in Novosibirsk, Irkutsk, Yakutsk, Ulan-Ude, Tomsk and Krasnoyarsk.

Twelve years ago the Far Eastern Scientific Center of the USSR Academy of Sciences budded off from us, and "remote" divisions and laboratories have been created in Barnaul, Kemerovo, Kyzyl, Omsk and Tyumen'.

We should also note the following. The Siberian Department was created with the purpose of ensuring, through the development of fundamental research, solution of applied problems fundamentally important to Siberia's national economy.

Here is a concrete example: Expansion of the scale of industrial development of new Siberian territories made it extremely important to study the behavior of materials at low temperatures. This fundamental problem is of interest to many areas of science. But it is vitally important to northern Siberia: In severe cold, metal becomes brittle, breakdowns and mishaps arise, and as a result machinery stops. This is why solving the problems associated with the behavior of matter and materials at low temperatures was one of the main directions of the work of the Institute of Physical Technical Problems of the North in Yakutsk.

Or take another topic which would seem to be of purely theoretical research interest--studying the flow of particles from outer space and their interaction with the earth's magnetic field and with the upper layers of the atmosphere. Why is this phenomenon being studied in Yakutsk? Because many physical processes associated with outer space proceed more clearly at higher latitudes, and because they have an especially great influence on the stability of radio communication in northern regions.

There are many such examples.

[Question] But is there not a danger in focusing the work of the institutes and their research on local problems? Might Siberian scientists striving to satisfy regional interests miss some of the phenomena that are important to world science?

[Answer] Unfortunately, even a brief description of the achievements of Siberian scientists in this area would take too much time. Therefore I will limit myself to simply listing them: development of the theory of volume determination formulas in mathematics; development of new numerical methods of solving the problems of mathematical physics and mechanics; validation of the grounds for the principles of building linear accelerators containing facing electron-positron beams; simulation (numerical and experimental in the laboratory) of complex phenomena such as hurricanes, cyclones and tornadoes; revelation of the features of the energy spectrum of cosmic rays by noncolliding shock waves; development of models of the earth's magnetosphere and ionosphere; development of the theory of catalytic reactions; discovery of the influence of the magnetic field on some types of chemical reactions and development of the theory of this phenomenon; synthesis of the gene for a human hormone, angiotensin, participating in regulation of blood pressure, and so on.

Each of these areas of research and many others doubtlessly deserve separate discussion in view of their importance.

[Question] Valentin Afanas'yevich, this is a very impressive list, and it says a great deal, even to the layman. But could you discuss in greater detail at least one project which you feel is especially important?

[Answer] In my opinion discussion of just one project would provide too narrow an impression of the fundamental research being conducted by scientists of our department. But if I must, let me touch upon a very important problem--the influence of such research on the effectiveness of social production. After all, the party's concern for preferential development of fundamental research is no accident. The results of fundamental research as a rule make revolutionary changes in practice.

Let me limit myself to just two examples: exploration for and extraction of minerals and the food program. The achievements of Siberian scientists are especially evident in these areas.

The 26th CPSU Congress turned special attention to developing progressive methods of geophysical and geochemical research. This is understandable: These methods are effective specific tools permitting us to "peek" into the depths of the earth.

A significant proportion of the assets invested into prospecting for minerals are now being spent on prospecting for oil and gas. Oil prospectors advancing into new regions are having to deal with increasingly more complex geological conditions and with the unique nature of the deposits. And what about permafrost? What about the rock concealing the resources? This rock covers enormous territories of eastern and northern Siberia, and it makes exploration very difficult.

To surmount these difficulties our department is developing vibroseismic prospecting methods. They are especially effective in investigation of large areas of significant depth. By combining them with electronic prospecting methods we open up the possibilities for direct detection of oil deposits. This means that the volume of exploratory drilling would decrease significantly. Thus the efforts of Siberian scientists will make it possible, in the final analysis, to noticeably reduce outlays on searching for the deposits.

Or here is another project. Studying the dispersal of various chemicals in loose deposits and then computer-processing the results, we can quickly and reliably evaluate the metal content of large territories. What does this mean? Once again the outlays would be decreased: Unpromising territories are immediately excluded from the zone of exploration. Thus by using the method proposed by Siberian geochemists we can reduce outlays on searching for deposits of optical calcite by a factor of four. And research on gold geochemistry has created conditions for enlarging extraction of this noble metal in the economically developed regions of Siberia.

Scientists of the Institute of Geology and Geophysics have managed to decode the highly interesting information "recorded" in pyropes--minerals usually found in association with diamonds. Serious research revealed that the chemical composition of pyropes depends on the conditions in which a kimberlite funnel forms. Knowledge of such conditions is very important, since it would permit us to reach conclusions as to whether or not diamonds are present. Consequently it does make sense to keep the project going.

All of these examples show how science is helping us to accelerate or cheapen exploratory and evaluational studies. But there are more things I would like to say about the extraction of natural resources.

Today the mining sectors of industry are "eating up" the lion's share of capital investments into Siberia's economy. To satisfy the country's demand for raw materials we are forced to advance into sparsely inhabited regions of northern and eastern Siberia and penetrate deeper and deeper into the earth--that is, the outlays are constantly growing. How could we reduce them?

One of the ways is to reduce the laboriousness of production, or in other words, to raise automation and mechanization. We know that the most labor-intensive processes in mineral extraction are well drilling, breakdown of rock, and the loading and transport of rock. Utilizing the results of theoretical research, scientists of the Mining Institute have developed new mechanisms such as, for example, pneumatic percussion reamers and vibrating loading-unloading units.

These examples show that the department enjoys good possibilities for intensifying mining industry. And in the conditions offered by Siberia, with its limited labor resources, achievement of these possibilities is especially important.

[Question] You promised to say more about the food program, to which special attention was devoted at the 26th CPSU Congress and at the November (1981) Plenum of the CPSU Central Committee. Our journal has already carried articles on some achievements of Siberian scientists in increasing agricultural production. What are the latest results of work in this area?

[Answer] It was no accident that I brought up the food program. It provides excellent confirmation for the thesis that fundamental research is important to practice.

Here is what might seem to be a totally irrelevant example. Geologists of the Siberian Department did some work on a purely theoretical problem--evolution of salt-bearing formations. This research opened up a new way for predicting the locations of mineral deposits. The Nepskiy potassium basin of East Siberia, in all probability the largest not only in the country but also in all the world, was discovered on the basis of a forecast made by Academician A. L. Yanshin.

What relationship could this have to the food program? The most direct: The yields of cereal and other agricultural crops could be raised dramatically in such areas by introducing mineral fertilizers, potassium fertilizers in particular, in the fields.

Siberia needs mineral fertilizer industry, which means it also needs potassium and phosphate raw materials. Discovery of the Nepskiy potassium basin will doubtlessly create the raw material base needed for production of potassium fertilizers.

[Question] But what about phosphates?

[Answer] There are some phosphorite deposits of unappreciable size in Siberia. It would naturally be unfeasible to create large chemical combines near them. The scientific grounds for a new method, so-called mechanochemical activation of phosphorus ore, have now been created. In contrast to traditional methods, this one does without sulfuric acid. But most importantly it opens up a new, more advantageous and convenient form of production organization--that is, it permits the use of mobile machine units in place of large combines, and thus it makes development of small phosphorite deposits, formerly viewed as unprofitable, effective.

Thus the raw material base for producing mineral fertilizers has now been prepared in Siberia. Now it is up to industry.

[Question] Would I be correct in saying that work on isolation and study of plant growth hormones can be included in the group of studies important to the food program?

[Answer] We have developed experimental processes and we now have a plant which is prepared to produce such preparations. We are now waiting on the results of extensive state tests.

I would also like to discuss another interesting project completed by Novosibirsk chemists jointly with specialists in aerodynamics. The insect pests of agriculture and forestry are basically controlled today by toxic chemicals. It is no secret that this does serious harm to the surrounding environment. Our specialists studied how aerosol particles behave themselves as they flow around different obstacles, for example plant leaves with caterpillars sitting on them. As a result they proposed a ground spraying procedure in which most of the particles of a toxic chemical would settle selectively on insects, and only a small proportion would land on plants and dirt. This would reduce the outlays, dramatically increase labor productivity and, what is most important, severely reduce toxic chemical residues in soil.

[Question] Valentin Afanas'yevich, creation of new highly productive varieties of agricultural plants and animal breeds is still believed to be the key problem of the food program. We know that Siberian scientists have made a substantial contribution to solving this problem. We have already heard about new varieties of wheat, rye, corn, soy and sugar beets developed in Siberia. Interesting experiments have been conducted by the Institute of Cytology and Genetics. What can we expect from these projects?

[Answer] The new varieties you have mentioned were basically developed by the method of chemical and radioactive mutagenesis--that is, by influence upon the hereditary traits of plants. These plants are distinguished by higher yields and resistance. Novosibirskaya 67, a variety of wheat created by radioactive mutagenesis in collaboration with scientists of the Siberian Department of the All-Union Academy of Agricultural Sciences imeni V. I. Lenin, is successfully adapting itself to Siberian fields.

Efforts to breed new varieties are continuing. Productive varieties of winter wheat and winter rye created by Siberian scientists are undergoing state testing. A hybrid sugar beet providing a 10-15 percent greater yield of sugar has been obtained.

Many interesting things can also be said about efforts to create new breeds of animals. The Institute of Psychology and Genetics noted above was the first to obtain viable and fertile hybrids of the domestic pig and the wild boar. What is important is that they have been adapted to maintenance in industrial complexes. These are only the first steps in utilizing the rich genetic fund of primitive breeds and wild animals. We plan to continue our work in this direction in Altay: A genetic center is now being created there.

[Question] The food program also foresees measures to ensure preservation of agricultural products. What is being done by the Siberian Department of the USSR Academy of Sciences in this connection?

[Answer] My answer may perhaps seem unexpected, but of all things, the achievements of high energy physics may play a large role here. Yes, I mean what I say: Scientists of our department's Institute of Nuclear Physics have developed a number of industrial accelerators and organized production of small series of such accelerators. Radiation technology is already being used in grain treatment: Accelerators are being used to destroy insects that spoil grain during storage.

[Question] But is this not dangerous? It is radiation, after all....

[Answer] Our specialists conducted some experiments with elevators in Novosibirsk and Odessa. The new technology is absolutely safe, and it is very effective. And radiation treatment of potato tubers not only prevents germination and rotting of the tubers but also raises their yield when planted.

I started and finished my story about efforts in the food program with examples of outwardly unexpected applications of fundamental research to practice. I did this on purpose in order to once again emphasize that as a rule, the major results of such research can be applied to many sectors of the national economy.

[Question] To be sure, there are concrete examples of this as well?

[Answer] Yes, there are many. But I will return to the radiation technology that we have already discussed. The accelerators of the Institute of Nuclear Physics I mentioned earlier are being used successfully to raise the stability of plastic used in cable articles, to produce heat-resistant polyethylene tubing (we know that 1 ton of such tubing saves 5 tons of metal) and to sterilize medical instruments. And imagine what sort of possibilities are opened up for creating new production processes! Cement production, treatment of synthetic leather, paints and varnishes, waste water treatment and so on.

Here is where, in my opinion, fundamental research is especially effective from the standpoint of practice: The need for finding a unique particular solution for each case is eliminated.

[Question] Valentin Afanas'yevich, it is no secret that introducing scientific achievements into practice is another problem. It is no accident that L. I. Brezhnev noted at the 26th CPSU Congress that introduction of scientific discoveries and inventions is now the decisive and most critical area. We can see from your story that the Siberian Department has a powerful potential for developing innovations important to the national economy. The question that arises is: What is the status of introducing such developments?

[Answer] Interaction between science and practice has developed into a multilevel system in our department. The "uppermost" level is represented by technical-economic reports on the largest developments to the USSR Gosplan. Since the end of 1979 we have submitted 20 reports of this sort. As a result of work done in divisions of the USSR Gosplan and the State Committee for Science and Technology as well as in the corresponding ministries and departments, we have gone far ahead on the road to introducing a large number of developments into the national economy.

Significant corrections have been made in the strategy of increasing the explored reserves of oil and gas and expanding the raw material base for production of mineral fertilizers in Siberia.

Procedures for palladiumless metal plating of printed boards and isolation of concentrates from thermal waters, an aerosol process of using chemical resources offering protection against insect pests, catalytic heat generators and many other projects are now in various stages of preparation for experimental industrial production. The USSR Gosplan actively supported our proposal to apply radiation technology to various sectors of the national economy.

[Question] And what is the next level?

[Answer] The next level is represented by coordinated programs of research and introduction on a cooperative basis with ministries and departments. In this area our department has discovered a number of channels of interaction with the national economic sectors, it has created an efficient system for summarizing results and developing new plans, and it has organized an exchange of information on the scientific achievements and on the needs of the appropriate industrial sectors. These are very important and productive ties.

A so-called "introduction belt" consisting of sector scientific research institutes and design offices has been created in the vicinity of the academy's research station in Novosibirsk. Owing to their interaction with academy institutes, the application of the results of fundamental research in industry is accelerating significantly. Novosibirsk industry has already given life to many developments of our scientists. Thus a blast stamping method developed by our department's Institute of Hydrodynamics was tried out for the first time in Novosibirsk at the Plant imeni V. P. Chkalov. Now it is used extensively in the sector. Or consider the manufacture of complex shaped articles from sheet metal by pressing in creep conditions, creation of vibration-safe tools and machines, blast welding and so on.

[Question] You have talked about many of the results of scientific research that have already enjoyed practical use or are now being introduced into the national economy. The "Sibir'" program enjoyed an especially vivid response from the scientific world. As we know, this program reflects the most important national economic problems of Siberia's development. Could you say something about how certain provisions of this program are being realized today?

[Answer] The "Sibir'" program has made it possible to take a new step forward in the 10th Five-Year Plan in strengthening the ties between science and the national economy. "Sibir'" is an entire complex of 40 specific-purpose scientific programs devoted to the study and effective use of fuel, energy, minerals, raw materials and biological resources, to environmental protection, to complex technical and technological problems of Siberia and to formation of territorial-production complexes.

"Sibir'" includes an integrated program of scientific-technical progress in the country's future as a separate regional subdivision.

The main directions of research being conducted according to the "Sibir'" program reflect the tasks of the economic development of the country and its eastern regions. But in terms of a number of important problems our efforts must be significantly intensified and expanded. It is now in the country's interest to deepen certain areas of the program. While at first it was oriented on implementing developments already at hand, with time it became clear that this was not enough.

Take as an example the problem of obtaining liquid fuel from coal and gas. Or the large complex of issues associated with the economic, ecological and social consequences of diverting part of the discharge of Siberian rivers to the country's southern regions.

To solve these and other major problems, the Siberian Department initiated extensive research, and it is even creating new scientific institutions.

As we know, the famous Kansk-Achinsk coal basin is in Krasnoyarskiy Kray, and only partially in Kemerovskaya and Irkutskaya oblasts. This is why the Institute of Chemistry and Chemical Technology was organized in Krasnoyarsk. Its purpose is to provide a scientific base for creating new production processes in coal chemistry. The problems of developing the natural resources of Udokan, which are very important to our country, are to be solved by a complex institute being created in Chita.

But it should not be thought that the efforts to complete the network of the academy's subdivisions have been finished. There is now a need for creating an academy-sponsored scientific base in Tyumen'. The genetics center being organized in Altay requires sizeable capital investments. And in general the problems of personnel, finances and equipment for young subdivisions of our department are rather acute. Unfortunately the solution to these problems depends on much more than just the Siberian scientists alone.

[Question] Valentin Afanas'yevich, is it not true that these problems could be solved in part by improving the system of planning and organizing your scientific research?

[Answer] Yes, this means of raising the effectiveness of scientific research was pointed out at the 26th CPSU Congress. And the Presidium of the Siberian Department instructed the executives of all of its institutes, the scientific councils and the joint scientific councils to once again attentively examine the subject matter of their scientific projects. The goal of this suggestion was to reduce the number of unpromising topics and thus transfer energies and assets to more important directions of fundamental and applied research. But maximum caution must be displayed.

Evaluating the importance of a project, the main thing is to keep from making mistakes, from basing decisions only on the possible benefit research might produce today. The future prospects of research must be determined from the standpoint of the fundamental nature of the problems being studied, and we must support collectives that have ventured into the unknown or are preparing to do so.

And of course, the most powerful factor promoting intensification of science is the training and proper placement of highly qualified personnel. We cannot of course plan the birth of a scientific genius who could provide nontrivial solutions to problems. It is all a matter of chance, even though it may be prepared for by the entire course of scientific development. But we are obligated to create conditions promoting not only the manifestation of the talent of a genius but also revelation of the capabilities of each person coming to science.

An entire system of training of personnel for science and the higher school has been created in our department with the active participation of one of its founders, Academician M. A. Lavrent'yev. This system includes work with schoolchildren, college students and young scientists.

Together with the Ministry of Education we are conducting school olympiads in mathematics, physics and chemistry, acquainting, by this and other means, gifted schoolchildren of Siberia and the Far East with the modern fundamentals of the sciences; we invite them to study in a special boarding school created at the Novosibirsk State University.

In order that students of the Novosibirsk University could assimilate their future specialties better, in their last years they work 2 days a week in the academy's institutes. The research they do is used as a learning tool. And concurrently science benefits. Our department submits 200-300 articles and inventor's certificates associated with diploma and course projects each year to the press and to the USSR State Committee for Inventions and Discoveries.

A joint order of the board of directors of the RSFSR Ministry of Higher and Secondary Specialized Education and the Presidium of the Siberian Department of the USSR Academy of Sciences has designated the Novosibirsk State University imeni Leninskiy Komsomol as the principal institution of higher education for improving the forms of interaction between the higher school and the academy's science effort in the Russian Federation.

The experience of the Novosibirsk State University's interaction with academy institutes is being utilized and developed in other scientific centers of the department.

[Question] Now this question. We know that mathematics--development of mathematical theory and its broad use for applied purposes--is now thought to play an important role in intensification of science. Tell us, at least briefly, about the work of Siberian mathematicians.

[Answer] Mathematical models of complex processes and phenomena, which are representatives of a unique form of mathematical technology, are a very promising direction in modern science. Such models make it possible to intensify applied research and accelerate experimental design work.

Our institutes have accumulated significant experience in this area. Computer centers in Novosibirsk and Krasnoyarsk have done much to create algorithms for controlling complex systems and processing aerial photography and geophysical information. Our department's Institute of Theoretical and Applied Mechanics has created packages of application programs broadly employed in the design of new models of equipment. These programs help to save much time and effort spent in the testing of models.

Examples of things you may be aware of include the mathematical model of interaction between the atmosphere and the ocean at the Computer Center, a model of an energy system at the Siberian Power Engineering Institute, models of chemical reactors at the Institute of Catalysis and so on.

Mathematical technology is a very effective means of solving the problems of automating planning, design and scientific research work using computers.

[Question] Valentin Afanas'yevich, we know that you, in your work at the Novosibirsk Institute of Organic Chemistry, initiated and have taken charge of a completely new direction in chemistry--use of computers in spectroscopy and chemical research. Work being done under your guidance in the use of computers to solve the problems of organic chemistry is well known not only in our country but also abroad. Use of computers to improve information support to research is said to be enormously significant today. What can you say in this regard?

[Answer] Use of computers in scientific research is also a way to intensify science. The amount of information being accumulated in different areas of knowledge is growing. And it is growing so swiftly that even the enormous network of sector and state centers of scientific-technical information cannot satisfy the growing demands of users.

We are now creating a network of automated information centers possessing their own data banks. These centers will be combined into a single information and computer network of the country. It will provide direct access of users to all data banks. There are, of course, tremendous reserves here for raising the labor productivity of scientists, engineers and technicians.

Let us look at an example you yourself brought up--the scientific information center on molecular spectroscopy of the Novosibirsk Institute of Organic Chemistry. An automated computerized complex collecting and storing information on the structure and physicochemical properties of organic compounds has been created here. This information is manipulated by computers.

Assume that a researcher comes up with a chemical compound of unknown structure. He often has to work several months to establish the structure of the substance. But a computer that can compare the physical (for example spectral) or chemical characteristics of a substance with previously accumulated characteristics of other substances can help the chemist solve this problem in a few minutes or hours.

Another task, synthesizing a substance with particular properties, is also one encountered extremely often. Here again a lengthy exhaustive search procedure is usually involved. Tens and hundreds of combinations must be tested, and one after the other the proposed variants are rejected. A computer, it turns out, can successfully do this task as well--propose a plan for creating a particular molecular structure to the chemist.

It should be noted in general that mathematization and automation of scientific research is a typical feature, and I would even go so far as to say that it is an important trend of modern knowledge. This is why Novosibirsk philosophers are looking very seriously at problems associated with logical-mathematical analysis of knowledge.

[Question] You have turned the discussion to philosophers. Not accidentally, I am sure. Methodological and philosophical aspects of the development of science occupy an important place in the formation of our society's scientific potential. The Novosibirsk Scientific Center--a unique capital of the Siberian Department--is one of the largest complexes of research on scientific knowledge in the country and abroad. What is the role of philosophers in this complex system which we refer to simply as Siberian science?

[Answer] There was obviously good reason for selecting the philosophical and methodological problems of the natural sciences as the principal subject to be studied by the philosophers of our department. Today the sole possible way of arriving at philosophical generalizations in the natural sciences is through collective effort, through development of common points of view on the basis of the sum total of knowledge.

Philosophy seminars have become an important element of such interaction in the Siberian Department. They are regularly conducted at the Novosibirsk Scientific Center, and they are devoted to methodological problems of social and natural sciences.

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UDC 630*863.001.7

OPERATING BIOCHEMICAL PLANT USING PUNCH CARD CONTROL PANELS

Moscow GIDROLIZNAYA I LESOKHIMICHESKAYA PROMYSHLENNOST' in Russian No 4, 1982 (signed to press 13 May 82) pp 5-9

NOVIKOV, G. P. and SIZOV, V. V.

[Abstract] In applying mini- and microcomputers to controlling production processes at small and medium-size plants, the authors stress the need for simplicity and economically-applied techniques and methods. Overemphasis on automation and neglect of punch card control has limited the effectiveness of these modern innovations. The authors propose a system that in their view covers overall control, basic and auxiliary production, economic and social functions. They stress the need for additional information and rationalization of control procedures. Specifically, they recommend that every director have a bank of information providing all necessary data for his particular operation, at each subsequent level of complexity. The basic information nucleus should be in punch card control panels based on an immediate card retrieval system. Indexing and the scope of information presented on each card is summarized. The system has been implemented at the Manturovskiy Biochemical Plant in recent years, but has had little effect on decisions at the plant. Salary and other bookkeeping procedures are being done, but more work is needed. Advances include implanting control technology and thereby making time available for creative and analytical pursuits, increased reliability of information, better communication between plant units, reduced losses in implementing aspects of the card control approach, and simplicity and accessibility. Figures 2, references 4: 3 Russian, 1 English.
[255-12131]

UDC 630*863.1 : 658.62.018 12

ADOPTION AND USE OF AUTOMATIC SYSTEM OF CONTROL OF PROCESSES AT KIROV BIOCHEMICAL PLANT

Moscow GIDROLIZNAYA I LESOKHIMICHESKAYA PROMYSHLENNOST' in Russian No 4, 1982 (signed to press 13 May 82) pp 20-21

KUIMOV, M. Ya., engineer

[Abstract] Automation to produce 60,000 tons of yeast annually involves 2 M-6000 computers and auxiliary equipment to control 6 sub-operations: "feed" (preparation of nutritive salts and lime milk), "thickening" (preparation of biomass by separation and evaporation), "hydrolysis," "fermentation," "substrate" and "furfural" subsystems complete the process. Along with these separate steps in production, the computers also monitor equipment status and technical and economic parameters of production, using disc actual operation-time methods. Beginning in 1978, with the aid of several specialized institutesm the plant gradually expanded its computerization. Information shortcomings have greatly restricted the economic effectiveness of the project. Production tests with hand-feeding of information began in 1980, and further additions to the system are to continue until 1984. Poor preparation, imperfection in the project plan, delivery delays of special measuring equipment and lack of close communications with the sponsor, the All-Union Biotechnical Scientific Research Institute, have all contributed to poor performance thus far. Lack of suitably-trained personnel has been another drawback, and a final important hindrance has been the lack of replacement parts when the equipment frequently broke down.
[255-12131]

UDC 662.74.001.83

COLLABORATION OF SCIENCE AND PRODUCTION

Moscow KOKS I KHIMIYA in Russian No 6, Jun 82 pp 4-5

RUDKEVICH, M. I., candidate of technical sciences, Coal Chemistry Scientific Research Institute

[Abstract] The author summarizes the Institute's involvement in basic research and the development of scientific technical processes that can readily be incorporated into production, through its contracts with nearly all the coke chemistry plants in the Ukraine as well as with metallurgical and machine building enterprises. It has prepared plans for various coke production lines, for improved evaluation of hydrogen purity for internal combustion engines, for producing superplasticizers for concrete and coal-tar modifiers for polyethylene. It has served as consultant for coal pulverizing innovations at the Donets Coal Tar Chemical Plant and for numerous primary metallurgical

organizations. Effective work in the Institute has been tied directly to wages. In the period 1976-1980, the Institute staff received 210 patents and 24 foreign patents; their exhibits at the Ukrainian and USSR Economic Exhibits earned 37 medals and certificates.
[254-12131]

UDC 662.74 : 547.53.067.8

PERFECTING TECHNOLOGY OF SULFURIC ACID PURIFICATION OF BTK FRACTION AT GUBAKHINSKIY COAL TAR CHEMISTRY PLANT

Moscow KOKS I KHIMIYA in Russian No 6, Jun 82 pp 23-25

TITUSHKIN, V. A., FROLOVNIN, Yu. V and CHAYSKIY, V. Ya., All-Union Coal Tar Chemistry Scientific Research Institute; DONTSOV, Yu. G., ZHITNIKOV, P. M. and ZHUKOVSKAYA, R. P., Gubakhinskiy Coal Tar Chemical Plant

[Abstract] Variations in the raw benzene received from three separate sources require variation in processing technology to obtain good quality "BTK" benzene at the Gubaklin plant. These sources of raw benzene are: i) that plant itself; ii) pyrolyzed resin from synthetic-alcohol plants; and iii) low-sulfur raw benzene from other coal-tar enterprises. The authors purified three BTA fractions; viz., its own BTA fraction, a 3 : 1 mixture of BTA fractions from its product and pyrolyzed resin and a 9 : 11 mixture of its BTK product and low-sulfur benzene, with an added 8-10% pyrolyzed resin. Purification involved 92-94% by mass of sulfuric acid, a contact time of 10 minutes, and sulfuric acid and piperylene fraction flow at 9-17 and 1-6% respectively of the fraction, depending on the exact mix. Results showed that at these parameters any of the initial input raw materials produced standard quality benzene "for nitration." Further data were collected on boiling points and bromine number (elevated from 0.09 to 0.15 g/100 ml) and crystallization temperature (reduced to $\leqslant$ 5.15°C). Further processing at the rectification stage does improve the benzene properties.
[254-12131]

UDC 662.62

MINERAL COMPONENTS OF COALS

Moscow KHIMIYA TVERDOGO TOPLIVA in Russian No 3, May-Jun 82
(manuscript received 26 Dec 80) pp 35-43

SHPIRT, M. Ya., Institute of Combustible Minerals

[Abstract] Study of mineral components of coal other than its organic mass has included geochemical features of formation and conversion, methods for determining composition and properties, and creation of processes for using organic and mineral components of solid combustible minerals. The present report analyzes the results of studies of mineral component properties and their conversions during coal processing. Nearly all elements except for inert gasses, platinum group metals, technecium, and rare earth and radioactive elements are found in coals and shales, which seem to be natural concentrators of elements. The author stresses on macrocomponents that have been studied by petrographic and chemical methods, in the categories of oxides, alumosilicates, carbonates, sulfides, sulfates and chlorides, and organic minerals. Various data indicate that solid combustible ores are not a crude mechanical mixture of organic and mineral substances, but complex compositions in which mineral components have a significant impact on storage and processing. Enrichment of coals and shales depends in many ways on clay substances they contain. Liquid phase hydrogenation can produce liquid organic and organic-mineral products and leave mineral components as solid products. A brief discussion of microcomponents touches upon efforts to remove harmful elements and recover valuable ones in thermal processing of coals and shales. References 26: 18 Russian, 8 English.
[246-12131]

UDC 541 (126 + 64) : 547.241

COMBUSTION FEATURES OF COMPOSITIONS OF POLYMETHYLMETHACRYLATE WITH CERTAIN PHOSPHORIC ACID ESTERS

Moscow VYSOKOMOLEKULYARNYYE SOYEDINENIYA in Russian Vol 24, No 4, Apr 82 (manuscript received 4 Jan 81) pp 864-869

RAZINSKAYA, I. N., SUMENKOV, K. F., PLAKSINA, N. L., LIKHTEROV, V. R., POMERANTSEVA, E. G. and SHTARKMAN, B. P.

[Abstract] In combination with PMMA, the title esters assure high opacity and reduce flammability. The authors studied such mixtures to determine their role in fire resistance of the polymer, using tris-(2-choroethyl)phosphate with tris-(1 methyl-2-choroethyl)-phosphate, and phenyl-bis-(2-choroethyl) phosphate with phenyl-bis-(1-methyl-2-chloroethyl)phosphate. The oxygen index, used as an indicator of fire resistance, indicated that the second and fourth phosphates were the most effective antipyrenes for addition to PMMA. The more tris-(2-chloroethyl)phosphate added to the composition, the more oxygen it held and hence, the higher its rate of combustion. Exchanging a primary alcohol radical for a secondary one in phosphoric acid esters increased their fire-extinguishing properties for PMMA, regardless of decreases in their phosphorus and halogen content. Gaseous products of pyrolysis contained the initial antipyrenes as well as chlorine-containing products of thermal decomposition, indicating a cooling role for the phosphates. Their chemical structure had a key role in combustion. Figures 6; references 12: 11 Russian, 1 English.
[228-12131]

UDC 541.141.1

PHENOMENOLOGICAL COMBUSTION MODEL IN LOW TEMPERATURE CHEMICAL REACTIONS

Moscow KHIMICHESKAYA FIZIKA in Russian No 5, May 82 (manuscript received 22 Oct 81) pp 685-691

BENDERSKIY, V. A., MISOCHKO, Ye. Ya., OVCHINNIKOV, A. A. and FILIPPOV, P. G., Department of the Institute of Chemical Physics, USSR Academy of Sciences, Chernogolovka Division

[Abstract] Previously the authors showed that at helium temperatures in saturated hydrocarbons containing chlorine, combustion occurs upon cooling

after preliminary photolysis creates critical radical concentrations. Data indicate that a supplementary parameter is involved relating to mechanical properties of the matrix and the linking rate. The model developed to demonstrate this is based on the hypotheses that part of the raction's heat effect is expended to create tensions that relax in proportion to increasing temperature, and combustion occurs almost isothermally and creates deformations that in turn increase the reaction rate constant. Low-temperature and high temperature phenomena are discussed. Increasing temperature causes simultaneous growth and speed of reaction and of relaxation, and the latter in turn slows the reaction. Thus heat and deformation combustion are characterized respectively by low temperature and high temperature extremes. Figures 5; references 11: 8 Russian, 3 Western.
[235-12131]

UDC 536.46 - 546.27

LIMITING STAGE IN BORON OXIDATION IN COMBUSTION PROCESSES

Moscow KHIMICHESKAYA FIZIKA in Russian No 5, May 82 (manuscript received 26 Nov 81) pp 692-697

GRIGOR'YEV, Yu. M. and SAFANEYEV, D. Z., Department of the Institute of Chemical Physics, USSR Academy of Sciences, Moscow

[Abstract] Knowledge of the vaporization mechanism of a B_2O_3 coating is necessary to interpret the combustion mechanism of boron particles in media containing oxygen. Since previous research has given contradictory results, the authors made direct measurements of the vaporization rate under controlled conditions by heating boron threads electrically in argon to a constant temperature and holding them for various periods, after oxidizing the threads to obtain about 5 mcm coating of B_2O_3. Evaluation of changes in the coefficient of convective head loss showed that only insignificant amounts of B_2O_3 evaporated. An electrothermographic method was used to show that there was little different in integral radiation capability with the boron oxide coating and without it. Evaporation was judged to be steady, without sudden variations, as shown by electric power measurements of the boron thread. For practical purposes a diffusion-controlled evaporation theory can be applied to B_2O_3 evaporation. Figures 3; references 19: 13 Russian, 6 Western.
[235-12131]

UDC 66.095.83

REDUCTION AMINATION OF ISOBUTYRIC ALDEHYDE TO ISOBUTYLAMINES IN PRESENCE OF VARIOUS HYDROGENATING CATALYSTS

Leningrad ZHURNAL PRIKLADNOY KHIMII in Russian Vol 55, No 5, May 82 (manuscript received 4 Aug 80) pp 1122-1126

SMAYEVA, T. P., YAKUSHKIN, M. I., AKULOVA, N. G., BAZYLEVA, R. V. and LEBEDEVA, N. V.

[Abstract] The title amination is promising due to the rapid growth of the oxosynthesis industry, since the isobutylamines obtained can then be used to produce new surface-active substances and additives for fuels and lubricants. To simplify the process, the authors conducted the amination at atmospheric pressure in the presence of both available and specially synthesized catalysts. At high temperatures, secondary and tertiary amines formed due to disproportionation of the primary amine. The process, which is summarized in the experimental section, allowed good aldehyde conversion with cobalt on aluminum oxide the best catalyst for monisobutyl amine, rhodium on aluminum oxide and alumoplatinum best for diisobutyl amine, and palladium on carbon best for obtaining triisobutyl amine. A chromatographic analysis method for catalysates identified both intermediate products--secondary aldimines and isobutyronitrile--and the isobutyl amines. Figures 2; references 15: 6 Russian, 9 Western.
[251-12131]

NEW MINERAL FERTILIZER PRODUCTION ASSOCIATION FORMED

Moscow MOSKOVSKAYA PRAVDA in Russian 30 May 82 p 1

[Article by Correspondent Yu. Fel'chukov, Press Center, Ministry of Mineral Fertilizer Production: "The Arsenal of the Harvest"]

[Text] At first glance the fields of the agrochemical experimental station of the Scientific Research Institute of Fertilizers and Insectofungicides (NIUIF) do not look any different from ordinary farm fields. But these fields are special--it is here that new forms of mineral fertilizers are given their first taste of life.

Incidentally, fertilizers undergo testing not only here near Moscow, but also in other climatic zones, in the most diverse soils beginning with chernozem and ending with desert sand.

The importance of this work can be compared, without stretching, to the work of breeders selecting new varieties. Just 100 kilograms of nitroaminophos can ensure a 4-7 centner increase in the yield of winter wheat and barley per hectare, even from the poor soils of the nonchernozem zone.

The experimental plots are in a sense the last step before the end of the long road from the laboratories of the scientists, through experimental production in "big chemistry," and then to the fields of the country. These fields are the culmination of the work of several organizations contained within the "Minudobreniya" NPO [Scientific-Production Association] of the Ministry of Mineral Fertilizer Production. It was created about 2 years ago, when three organizations, widely known not only in our country but also abroad and having more than a half-century history behind them, were brought together "under one roof." They include the NIUIF, which recently celebrated its 60th anniversary, "Giprokhim"--the master planner of practically all chemical industry enterprises in the USSR, and an experimental plant which was created back in 1929. Each subdivision of the "Minudobreniya" NPO has accumulated extremely rich experience and possesses highly skilled scientists, engineers, technicians and laborers. Their unification was a natural step: They had cooperated with each other to one degree or another for many decades, even though they had been organized separately and each had its own interests, which were not always consistent with the interests of their partners.

"Now the situation has changed," said the general director of the "Minudobreniya" NPO, A. A. Novikov. "We are successfully completing the first stage of reorganization of all of the work, the main objective of which is to achieve close cooperation between the subdivisions, so that the achievements of science could be introduced into production faster. We can already see that a significant number of the disagreements which had formerly arisen between the researchers and planners for example, have resolved themselves. The ties of the researchers, planners and the experimental plant with industry have become closer."

In the first year of the five-year plan colleagues of the NIUIF completed their research plan ahead of schedule. It included 72 scientific developments requested by industrial enterprises and other organizations. In this case the scientists devoted their main attention to creating new forms of fertilizers and intensifying and improving production of phosphoric and sulfuric acids and feed phosphates using new technical concepts making it possible to significantly reduce consumption of raw materials, fuel and power and to protect the environment.

As an example the laboratory led by Doctor of Technical Sciences P. V. Klassen discovered production concepts making it possible for enterprises to reach their planned output--that is, to extract practically all of the initial raw material used to make phosphoric acid--in a relatively shorter time. Quite recently, meanwhile, extraction of just 70 percent was said to be a good result. Efforts aimed at introducing new forms of raw materials into production are no less significant to the national economy.

The collective of the experimental plant is working in close contact with the scientists. The reconstruction which ended in 1975 is referred to as a second birth. Today, one could only guess that this is a chemical enterprise by entering its bright, spacious shops, where the eyes are confused by a complex jumble of pipes and air ducts and where one sees carefully stacked sacks of finished products. In contrast on the outside there is a large rose garden, there are beds of peony and phlox, walnut trees line the lanes, and the fruit trees provide homes to noisy, busy birds. Nor is there "an odor" of chemistry here. Living nature--the best indicator--reacts keenly to any environmental contamination.

The activities of "Giprokhim" and its affiliates include integrated planning of enterprises producing sulfuric acid and phosphorus fertilizers. In accordance with party and government directives, the planners are concentrating their main efforts on rebuilding existing enterprises. As an example a plan for rebuilding the sulfuric acid production operations at the "Azot" Production Association in Rovno will make it possible not only to improve working conditions but also promote environmental protection. It is noteworthy that the sulfur the enterprise will be using in the future will be extracted from natural gas and petroleum. Thus it will transform from an undesirable impurity into a raw material.

And so, even a cursory acquaintance with the work of the "Minudobreniya" NPO would show that the collective is on the right road. But could the association work better under the new conditions, with an even greater payoff? Everyone I talked to replied in the affirmative. They named numerous causes of the most diverse nature as the stumbling blocks. Included among them are problems which cannot be surmounted by the efforts of the collective alone, even though they do seriously retard not only the work of the particular subdivision but also the association as a whole.

Take as an example the experimental plant. Its name alone says something about the profile of this unique enterprise, and defines its main task--promoting transmission of scientific-technical developments born in the laboratories through experimental industrial production into industry. But for reasons having nothing to do with the workers of this production operation, things are not going as they should. The enterprise's plan places quantity uppermost: There are about 200 consumers awaiting and demanding its--repeat, its--products, since this plant has been designated as their supplier.

Thus a paradoxical situation has evolved: General-purpose experimental facilities created at the plant and offering a possibility for reducing testing time by several orders of magnitude are tied up in quantity production, while scientific developments requiring experimental testing not in the test tube but in real production facilities are slowly growing obsolete.

It is still early to make any generalizations--not enough time has passed since the association was organized. But we can boldly state that it is off to a good start. This is a dependable guarantee of forthcoming successes in the struggle to implement decisions of the May (1982) Plenum of the CPSU Central Committee and the directives and recommendations of Comrade L. I. Brezhnev. The yields at hundreds of the country's farms will depend in many ways on the work of the association's collective.

11004
CSO: 1841/261

FERTILIZER ASSOCIATION PLEDGES HIGHER OUTPUT

Moscow SOTSIALISTICHESKAYA INDUSTRIYA in Russian 4 Jun 82 p 1

[Article by V. Morshanskiy, party committee secretary, "Kuybyshevfosfor" Association: "In Addition to the Plan"]

[Text] Our association has a direct relationship to implementing the decisions of the May Plenum of the CPSU Central Committee. We produce mineral fertilizers--the elixir of fertility.

New socialist pledges were adopted at a meeting of the active party members and administrators, in which the results of the plenum were discussed. They decided to surpass the production plan by 10,000 tons of mineral fertilizers and 70 tons of carbophos.

The association's products are in demand. Hothouses use its crystallin, and its phthalophos is a good agent against the Colorado beetle. Its nitrogen-phosphorus fertilizers are supplied to the fields of hundreds of kolkhozes and sovkhozes.

Plans have also been made to hasten development of the association's own subsidiary farm.

Fulfilling annual pledges adopted in honor of the 60th anniversary of the USSR's formation ahead of schedule: This is the slogan under which all of the association's subdivisions are competing.

11004
CSO: 1841/261

UDC 631.84/85

OBTAINING 'CARBONITROPHOSKA' (CARBON, NITROGEN, PHOSPHORUS, POTASSIUM FERTILIZER)

Leningrad ZHURNAL PRIKLADNOY KHIMII in Russian Vol 55, No 5, May 82
(manuscript received 15 Dec 80) pp 977-980

KOCHEMBA, Yu. I. and SHENKIN, Ya. S.

[Abstract] The common Soviet method for obtaining "nitrophoska" uses a mixture of nitric and sulfuric acids to decompose natural phosphate, with calcium nitrate or ammonium sulfate used to remove calcium. The authors propose nitric acid processing of phosphates in a method that avoids retrogradation of phosphorous anhydride and permits production of practically all the P_2O_5 in a water-soluble form. This happens because in dissolving the fertilizer in water, urea nitrate enters the solution as nitric acid which breaks down finely-dispersed calcium phosphates into phosphoric acid. The present process obtains carbonitrophoska by breaking down natural phosphate with sulfuric and nitric acids, neutralizing the pulp with ammonia, mixing it with a solution of carbamide and potassium chloride, and then granulating and drying the product. The process reduces the pH of the pulp during ammoniation, cuts sulfuric acid use and uses carbamide in pulp neutralization. Production tests were successful, yielding high percentages of water-soluble P_2O_5. The "carbonitrophoska" practically did not differ in hygroscopicity from "nitrophoska," and was stored as long as 6 months with little change. Figures 2; references 6 (Russian).
[251-12131]

UDC 546.171.1'185 : 542.936

DEHYDRATION KINETICS OF MONOAMMONIUM PHOSPHATE AND AMMONIUM POLYPHOSPHATES

Leningrad ZHURNAL PRIKLADNOY KHIMII in Russian Vol 55, No 5, May 82
(manuscript received 3 Apr 80) pp 1148-1153

RILO, R. P., KULIKOV, B. A. and KAGANSKIY, I. M.

[Abstract] In obtaining liquid fertilizers by high temperature ammoniation of extraction phosphoric acid, the best method involves the reaction through

formation of monoammonium phosphate followed by dehydration. Since there are contradictions about this process in the literature, the authors studied the degree of dehydration according to a material balance formula that agreed with the process's chemical mechanism, and was more precise than approaches that do not consider the distribution of individual forms of condensed phosphates and the degree of ammoniation. Studies were made of the title phosphates in temperature intervals from 80 to 650°C. Thermographic results at the various temperatures are summarized. Results showed four stages of mass loss: insignificant losses up to 180°C (0.2-1.5%); more intensive decomposition at 440-475°C with 25% mass loss and the formation of ring phosphates; reduced rate of loss at 475-622°C with 33% total loss, and practically complete evaporation of azeotropic mixtures at 622-740°C. The thermal decomposition and polycondensation was more intensive for monoammonium phosphate. Figures 5; references 16: 10 Russian, 1 Polish, 4 Western.
[251-12131]

UDC 541.123

SOLUBILITY IN $NH_4H_2PO_4$-$(NH_4)_2H_2P_2O_7$-H_2O SYSTEM AT 0°

Leningrad ZHURNAL PRIKLADNOY KHIMII in Russian Vol 55, No 5, May 82
(manuscript received 30 Jun 80) pp 1153-1154

KUZNETSOVA, A. G. and IL'INA, T. L., Chemico-Technological Institute imeni
D. I. Mendeleyev, Moscow

[Abstract] The title system is found among the salts that make up complex liquid fertilizers. The authors studied its solubility by an isothermal method at 0°C using monoammonium phosphate, diammonium pyrophosphate and tetraammonium pyrophosphate. Paper chromatography showed the absence of salts with a greater degree of dehydration. The data obtained show that until the liquid phase contains up to 19.5% diammonium pyrophosphate, the solubility of $NH_4H_2PO_4$ remains essentially constant. Higher concentration of $(NH_4)_2H_2P_2O_7$ bring reduced solubility of monoammonium phosphate. The proportions of these two phosphates in the system determine the nutrient content of the fertilizer, with the maximum (40.6%) nutrient level at the eutonic point. Figure 1; references 6: 5 Russian, 1 Western.
[251-12131]

UDC 631.8

HYGROSCOPIC PROPERTIES OF NEW FORM OF NKMg-FERTILIZER 'NITROKALIMAG'

Leningrad ZHURNAL PRIKLADNOY KHIMII in Russian Vol 55, No 5, May 82
(manuscript received 14 Jul 81) pp 1157-1159

SOKOLOV, I. D., CHEREMNYKH, L. M., SAFRYGIN, Yu. S. and ANDREYEVA, N. K.,
All-Union Scientific Research and Planning Institute for Halurgy

[Abstract] The Institute has developed the title fertilizer based on nitric acid break-down of polyhalite ores; the authors present the results of hygroscopic studies that are essential in organizing industrial production and agricultural application. The coefficient of hygroscopicity, expressed as a tangent of the slope of the kinetic curve of moisture sorption at the start of the test, was determined for "nitrokalimag" composed of 55.77% KNO_3, 42.48% $Mg(NO_3)_2$, and 1.75% $CaSO_4$. Results showed that the critical humidity at 25% for the compound was 56.0%, and the coefficient of hygroscopicity at 81.0% humidity was 9 millimoles. These factors must be considered in storing and transporting the fertilizer. Figures 6; references 11: 9 Russian, 1 Polish, 1 Czech.
[251-12131]

UDC 547.234.1 + 547.241 + 541.127

QUANTITATIVE EVALUATION OF ALPHA-EFFECT IN HYDRAZINE DERIVATIVE REACTIONS WITH CERTAIN SUBSTRATES

Ivanovo IZVESTIYA VYSSHIKH UCHEBNYKH ZAVEDENIY: KHIMIYA I KHIMICHESKAYA TEKHNOLOGIYA in Russian Vol 25, No 4, Apr 82 (manuscript received 1 Jul 80) pp 419-422

YANCHUK, N. I., Department of Organic Chemistry, Ternopol' State Pedagogical Institute imeni Ya. A. Galan

[Abstract] The authors studied the alpha-effect in reactions of mono- and disubstituted hydrazine derivatives with phenylisocyanate, phenylisothiocyanate and picryl chloride, and compared the reactivities and structures of the products. The alpha-effect, a positive deviation of the alpha-nucleophile point from the Bransted line for compounds with usual reactivity, was determined quantitatively as the relation of alpha-nucleophile constant of reaction rate and of the primary arylamine of equal basicity. Data showed that the highest alpha-effect was with monosubstituted hydrazine derivatives in reactions with phenylisocyanate. In descending order, reaction capacity followed the order of hydrazides of aromatic carboxylic acids, of aliphatic carboxylic acids, sulfo acids, diarylphosphonic acids, 0,0-diarylphosphonic acids, 0,0-diarylthiophosphoric acids, arylhydrazides, and the least reactive, hydrazides of aromatic thiocarboxylic acids. The alpha effect's appearance depended on both the nature of the nucleophile reagent and of the substrate, and was conditioned by the reaction's mechanism. References 23: 17 Russian, 6 English.
[244-12131]

ORGANOMETALLIC COMPOUNDS

UDC 547.(245+246+258.2)

SYNTHESIS OF BIHETEROORGANIC OXIDES OF TIN, GERMANIUM, AND SILICON AND THEIR REACTIONS WITH BENZENESULFONYLISOCYANATE

Leningrad ZHURNAL OBSHCHEY KHIMII in Russian Vol 52, No 5, May 82 (manuscript received 18 Aug 81) pp 1190-1194

MYSIN, N. I., DERGUNOV, Yu. I., VODOP'YANOV, V. G., GEREGA, V. F. and YURKOVA, N. N.

[Abstract] Descriptions are provided of the reactions of Et_2NMEt_2 (M = Ge, Sn) type heteroorganic amines with triethylsilicon (or germanium) hydroxide, which proceeded initially at 40°C and then exothermically to give both high yields of biheteroorganic oxides and diethylamine. The biheteroorganic oxides of silicon, germanium, and tin reacted at -10°C with benzenesulfonylisocyanate under equimolar conditions to yield unstable biheteroorganic derivatives of arylsulfonylcarbamates; only the N-triethylgermanium-N-phenylsulfonyl-O-triethylsiliconcarbamate remained stable at temperatures approaching 80°C. Reaction of triethylsiliconoxidetriethylgermanium with phenylsulfonylisocyanate in 1:2 ratio yielded N-triethylsilicon-N'-triethylgermanium-bis(Phenylsulfonyl) urea. References 6: 3 Western, 3 Russian.
[253-12172]

UDC 542.91 : 541.124 : 541.49 : 546.92 : 546.98

SYNTHESIS AND STUDY OF HYDRAZINE-N,N-DIACETATES OF PLATINUM (II) AND PALLADIUM (II)

Moscow IZVESTIYA AKADEMII NAUK SSSR: SERIYA KHIMICHESKAYA in Russian No 4, Apr 82 (manuscript received 18 Nov 81) pp 780-783

ZHELIGOVSKAYA, N. N., SHCHELOKOVA, L. R., POPOV, L. V., GREVTSEV, A. M. and SPITSYN, V. I., Moscow State University imeni M. V. Lomonosov

[Abstract] In contrast to other compounds containing platinum (II) and palladium (II), their compounds with hydrazine-N,N-diacetic acid have received little attention. The authors synthesized these compounds as described in the experimental section, and studied their physicochemical properties. Both

metals and any halide groups in synthesized compounds were measured for the first time by reducing the compounds from solution with hydrazine-hydrate during prolonged boiling. Infrared spectra of the compounds indicate a transverse structure, while potentiometric titration showed that all H+ atoms titrate in the acid range of pH 1-4, with inflections observed when 2 and 4 equivalent units of KOH were added. The ion force created by the basic electrolyte was sufficient to suppress hydrolysis. Halogen groups in the compounds were quite strong for given ion force levels. Physicochemical studies showed that hydrazine-N,N-diacetic acid combines with Pt(II) and Pd(II) as mono- and bidentate ligands, forming highly stable complexes with pronounced acidic properties. References 9: 5 Russian, 4 Western.
[216-12131]

UDC 542.91 : 547.1'119

SYNTHESIS OF CERTAIN ARSENIC-CONTAINING ENINE DERIVATIVES OF DIHYDROPYRANE, DIHYDROTHIOPYRANE AND TATRAHYDROPYRIDINE

Moscow IZVESTIYA AKADEMII NAUK SSSR: SERIYA KHIMICHESKAYA in Russian No 4, Apr 82 (manuscript received 28 May 81) pp 933-935

YAGUDEYEV, T. A., DZHAKIYAYEV, G. M., NURGALIYEVA, A. N. and GODOVIKOV, N. N., Institute of Heterorganic Compounds imeni A. N. Nesmeyanov, USSR Academy of Sciences, Moscow

[Abstract] The authors found a new convenient method for obtaining arsenic derivatives through the action of arsenic halides on acetylenides of alkali- and alkali- earth metals involving the reaction of Li-Al-organic enine complexes with phenyldichloroarsine. At 60-65° in pyridine or "TGF" [expansion unknown], the title compounds from corresponding enine derivatives, with an accompanying shift of one Cl atom. The reaction of dihydropyrane with chloride derivatives also produced asymmetrical arsenic derivatives. Details of the procedures are given in the experimental section. References 4 (Russian).
[216-12131]

UDC 541.49 :(661.9.321 + 546.18286.5)

REACTION OF PHOSPHORUS OXYTRIISOTHIOCYANATE WITH TITANIUM, ZIRCONIUM AND HAFNIUM TETRACHLORIDES

Kiev DOKLADY AKADEMII NAUK UKRAINSKOY SSR, SERIYA B: GEOLOGICHESKIYE, KHIMICHESKIYE I BIOLOGICHESKIYE NAUKI in Russian No 3, Mar 82 (manuscript received 10 Dec 81) pp 46-48

SKOPENKO, V. V., corresponding member, UkSSR Academy of Sciences, BRUSILOVETS, A. I. and SINKEVICH, A. V., Kiev State University

[Abstract] Previous studies had shown that phosphorus oxytriisothiocyanate, coordinating through oxygen, formed $MCl_4.2OP(NCS)_3$. The present authors show

the synthesis and properties of $MCl_4 \cdot OP(NCS)_3$(M=Ti, Zr, Hf) and $TiBr_4$ $OP(NCS)_3$. Synthesis was conducted in an atmosphere of purified argon, with the ligand being added to a solution or suspension of the halogenide in slightly excess quantities. Adducts were isolated during isothermic crystallization. X-ray phase analysis confirmed the uniqueness of the compounds, while cryoscopic determination of the molecular mass of $TiCl_4 \cdot OP(NCS)_3$ in bromoform pointed to its dimer structure. Comparison of infrared and Raman effect spectra of $[TiSl_4 \cdot OP(NCS)_3]$ indicated the presence of centers of symmetry related to the C_{2h} group point. References 4: 1 Russian, 3 English.
[220-12131]

UDC 547.491.6'.246'.258.11

SYNTHESIS AND PROPERTIES OF CARBODIMIDES AND CYANAMIDES CONTAINING SILICON, GERMANIUM, LEAD AND TIN

Moscow USPEKHI KHIMII in Russian Vol 51, No 5, May 82 pp 848-878

GORDETSOV, A. S., KOZYUKOV, V. P., VOSTOKOV, I. A., SHELUDYAKOVA, S. V., DERGUNOV, Yu. I. and MIRONOV, V. F.

[Abstract] The authors review and categorize the literature published until 1980 on the synthesis, reaction capability, physicochemical properties and application of the title compounds. Under methods of synthesis, they discuss reactions of cyanamide and its derivatives with heteroorganic compounds such as di- and polysilylcarbodiimides and N-(tributylplumbil)carbodiimide, reactions of halogen cyanogens with silicon-containing amino derivatives, reactions involving ureas and thioureas, those involving metallized silylamines, decarboxylation of isocyanates, and other methods. NMR tests showed the possibility of obtaining asymmetrical silylgermylcarbodiimides. They discuss physicochemical and chemical properties dividing the latter into reactions involving cumulative carbodiimie bonds, and reactions accompanied by rupture of the nitrogen bond with another element. The latter category includes reactions with compounds containing a mobile hydrogen atom, those with halogens and halogen-containing compounds, and ones with thiourea and thioamide derivatives. Practical applications of heteroorganic carbodiimides and cyanamides include polymer synthesis and production of certain organic compounds and industrial chemicals. Carbodiimides containing silicon make insulating coatings, while those containing tin stabilize polyvinyl chloride compositions and catalyze urethane production. Tin-containing cyanamide derivatives are antibacterial, while those containing lead are antioxidants and oil additives. References 221: 73 Russian, 148 Western.
[248-12131]

UDC 542.91:541.49:547.1'13

SYNTHESIS AND REACTIONS OF MERCURY BIS(BENZYLCHROMOTRICARBONYL)

Moscow IZVESTIYA AKADEMII NAUK SSSR: SERIYA KHIMICHESKAYA in Russian No 5, May 82 (manuscript received 24 Jul 81) pp 1131-1134

RAZUVAYEV, G. A., ARTEMOV, A. N., KASATKINA, T. G. and POSELENOVA, Ye. N., Institute of Chemistry, USSR Academy of Sciences, Gor'kiy; Scientific Research Institute of Chemistry, Gor'kiy State University imeni N. I. Lobachevskiy

[Abstract] The title compound (I) can be prepared by the reaction of dibenzylmercury with the triaminochromotricarbonyl complex. Four reactions are considered. 1. Compounds of type (I) react with 2 equivalents of I_2, yielding mercuric iodide and the corresponding arylchromocarbonyliodide (II). Compounds of type (II) cannot be prepared by the direct reaction of the aryliodide with the chromium hexacarbonyl complex. 2. Compounds of type (I) react with 2 equivalents of $LiAlH_4$ reducing the mercuric ion to the elemental mercury and the arylchromocarbonyl complex. 3. Compounds of type (I) react with mercuric chloride forming the benzylchromotricarbonylmercuric chloride (III). 4. Compounds of type (I) react with cupric chloride forming a mixture of (III) and benzylchromotricarbonylchloride. Details of syntheses and structural confirmations are given. References 12: 7 Russian, 5 Western.
[247-12027]

UDC 541.124:542.92:547.1'13

MECHANISM OF DECOMPOSITION OF ORGANOMETALLIC COMPOUNDS CONTAINING TRANSITION METALS AND ROLE OF INTERMEDIATE PRODUCTS AS CATALYSTS

Moscow IZVESTIYA AKADEMII NAUK SSSR: SERIYA KHIMICHESKAYA in Russian No 5, May 82 (manuscript received 12 Jun 81) pp 1134-1147

DOLGOPLOSK, B. A., ORESHKIN, I. A., TINYAKOVA, Ye. I. and YAKOVLEV, V. A., Institute of Petrochemical Synthesis imeni A. V. Topchiyev, USSR Academy of Sciences, Moscow

[Abstract] In general, the title reaction proceeds through an organic derivative of the metal, such as during hydrogenation, dehydrogenation, skeletal rearrangement, or deuteroexchange reactions. Substituted Mo and W compounds usually decompose by α-disproportionation with the formation of carbene and carbyne moieties. Benzyl-substituted neodynium and yttrium in THF quantitatively form carbenyl or carbynyl complexes. Trimethylsilyl-(germanyl)methyl-substituted W, Mo, Ta, Re, Nb, Rh, Pd and Pt form two types of carbene complexes: $(CH_3)_3SiCH$: and Ch_2:. Benzylmagnesium chloride reacts with Mo, W, Re, Rh, Pt and Pd with the formation of significant amounts of toluol, a product of the α-disproportionation of the benzyl group, and smaller amounts of stibine and tolane, products of recombination of the carbene and carbyne fragments. References 43: 29 Russian, 14 Western.
[247-12027]

UDC 547.242

CERTAIN PROPERTIES OF DIALKYLCYANARSINES

Tbilisi SOOBSHCHENIYA AKADEMII NAUK GRUZINSKOY SSR in Russian Vol 104, No 2, Nov 81 (manuscript received 28 Nov 80) pp 345-348

GIGAURI, R. D., ROBAKIDZE, A. N. and GOGIASHVILI, T. M., Tbilisi State University (presented by corresponding member of the Academy L. M. Khananashvili on 24 Nov 80)

[Abstract] Up until the present a nitrile structure has been attributed to dialkylcyanarsines, but one of the authors had previously showed that diarylchloroarsines react with potassium cyanide to produce cyanarsines that do not have nitrile properties. The authors have continued that research using Grignard reagent, expecting to obtain ketones containing ammonia. In fact, the products obtained were asymmetrical tertiary arsines. The radical of the Grignard reagent did not affect the direction of the reaction. Element analysis, infrared spectra and countersyntheses showed that specific features of such products as dibutyl(p-ethoxyphenyl)arsine correspond to those obtained with Grignard reagent and dibutylcyanarsine. Data obtained and the behavior of secondary cyanarsines during hydrolysis indicated that in dialkyl(aryl)-cyanarsines the bond between the arsenic atom and the nitrogen atom of the cyanogroup forms isonitriles. Chemical details are presented. References 10: 9 Russian, 1 English.

[203-12131]

ORGANOPHOSPHORUS COMPOUNDS

UDC 542.91:547.1'118

REACTION OF TRIPHENYLPHOSPHINE WITH ORGANIC HYDROTRIOXIDES

Moscow IZVESTIYA AKADEMII NAUK SSSR: SERIYA KHIMICHESKAYA in Russian No 5, May 82 (manuscript received 21 Oct 81) pp 1177-1179

SHERESHOVETS, V. V., GALIYEVA, F. A., SHAFIKOV, N. Ya., SADYKOV, R. A., PANASENKO, A. A. and KOMISSAROV, V. D., Institute of Chemistry, Bashkir Branch, USSR Academy of Sciences, Ufa

[Abstract] Examples of the title reaction are those of α-hydroxyiospropylhydrotrioxide (I) and α-hydroxyethylhydrotrioxide (II) with triphenylphosphine (TPP). The hydrotrioxides (HTO's) rapidly and quantitatively oxidize TPP and TPPoxide. TPP reacts on a 1:1 molar basis with hydroperoxides and ozonides; however, with ozone, the stoichiometry can vary from 1:1 to 2:1 depending on the initial TPP concentration. A method is developed for a quantitative determination of HTO's based on their reduction at -78°C to 0°C by excess TPP and a subsequent measurement of the unreacted TPP. References 9: 2 Russian, 7 Western.
[247-12027]

UDC 541.67:541.63:547.1'118

DIPOLE MOMENTS AND CONFORMATIONS OF BENZYLDIPHENYLPHOSPHINE OXIDES

Moscow IZVESTIYA AKADEMII NAUK SSSR: SERIYA KHIMICHESKAYA in Russian No 5, May 82 (manuscript received 7 Sep 81) pp 1179-1180

ISHMAYEVA, E. A., TSVETKOV, Ye. N., STRELKOVA, Ye. N. and PATSANOVSKIY, I. I., Kazan' State University imeni V. I. Ul'yanov-Lenin; Institute of Physiologically Active Compounds, USSR Academy of Sciences, Chernogolovka

[Abstract] Dipole moments (DM's) measured for compounds of the type $p\text{-}XC_6H_4CH_2P(O)Ph_2$ are as follows: (I) - X=H, 4.24D; (II) - X=Me, 4.40D; (III) - $X=NO_2$, 6.67D; and X=CN, 6.9D. Calculated DM values for the gauche and trans orientations of the $C_{sp^3}\text{-}C_{sp^2}$ and P=O bonds respectively are 4.25 and 3.93; 4.12 and 4.12; 6.83 and 0.2D; and 6.92 and 0.28D. As the volume of

the R substituent on the P atom in a series of compounds having the general form $R_2P(O)CH_2Cl$ decreases, the conformational equilibrium shifts towards the trans form. For R=Me, 90% of the material is in the trans form. References 12: 11 Russian, 1 Western.
[247-12027]

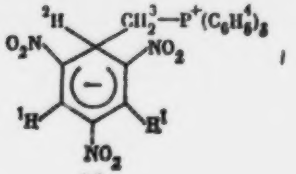
UDC 542.91:547.546:541.49:547.1'118

INTERACTION OF 1,3,5-TRINITROBENZENE WITH SULFUR AND PHOSPHORUS YLIDES

Moscow IZVESTIYA AKADEMII NAUK SSSR: SERIYA KHIMICHESKAYA in Russian No 5, May 82 (manuscript received 6 Jan 82) pp 1194-1195

YEGOROV, M. P., ARTAMKINA, G. A., BELETSKAYA, I. P. and REUTOV, O. A., Moscow State University imeni M. V. Lomonosov

[Abstract] The interaction of methylentriphenylphosphorane with 1,3,5-trinitrobenzene (TNB) in THF under an inert atmosphere at -5°C to 0°C results in an unusual zwitterion σ-complex (I) having the structure



(I)

TNB also reacts with other ylides, such as $Me_2SO{=}CH_2$ and $Me_3P{=}CH_2$ to form analogous products. The latter are brownish red crystals which are weakly soluble in THF. TNB is regenerated during acidification with HCl in methanol suggesting that the structural type is Pic $^-$Kt$^+$ where Kt$^+$ is Me_3S^+O or Me_4P^+. Some deprotonation of the TNB occurs resulting in the formation of $Ph_3P{=}CH_2$; however, the yield of $Pic^-(Ph_3PMe)^+$ is about 20 to 30%, due to the differences in basicity and nucleophilic tendencies of the respective ylides. References 1 (Russian).
[247-12027]

UDC 543.422.25:547.1'118

DIRECT OBSERVATION OF CONFORMERS OF 2-DIMETHYLAMINO-5,6-BENZ-1,3,2-DIOXAPHOSPHEPANE BY NMR

Moscow IZVESTIYA AKADEMII NAUK SSSR: SERIYA KHIMICHESKAYA in Russian No 5, May 82 (manuscript received 12 Jan 82) pp 1195-1196

ARBUZOV, B. A., AGANOV, A. V., KLOCHKOV, V. V., KADYROV, R. A. and ARSHINOVA, R. P., Chemical Institute imeni A. M. Butlerov, Kazan' State University imeni V. I. Ul'yanov-Lenin

[Abstract] Compounds of the form 2-X-1,3,2-dioxaphosphepane, (for $X=NMe_2$ (I) and OPh (II)), exist as an equilibrium mixture of the chair form (C) and the twisted form (T). At 149°K, interconversion between the two forms is slow and NMR parameters can be attained for each of the two conformers. At 288°K, the NMR values represent an equilibrium between C and T forms. The following are values for 149°K (T form), 149°K (C form) and 288° $C \rightleftarrows T$) respectively: δ (CH_3) - 2.35, 2.69 and 2.60 m.d.; δ_A - 4.98, 5.12 and 4.98 m.d.; δ_B - 4.72, 4.49 and 4.81 m.d.; $^3J_{POCH}$ (low field) - 10.3, 1.5 ± 1.5 and 7.3 hz; $^3J_{POCH}$ (high field) - 15.5, 24.1 and 18.3 hz. The equilibrium constant for the C and T forms is equal to 1.8 ± 0.2, $\Delta G_{C \rightleftarrows T} = 0.2 \pm 0.04$ kcal/mole at 149°K. References 2: 1 Russian, 1 Western.
[247-12027]

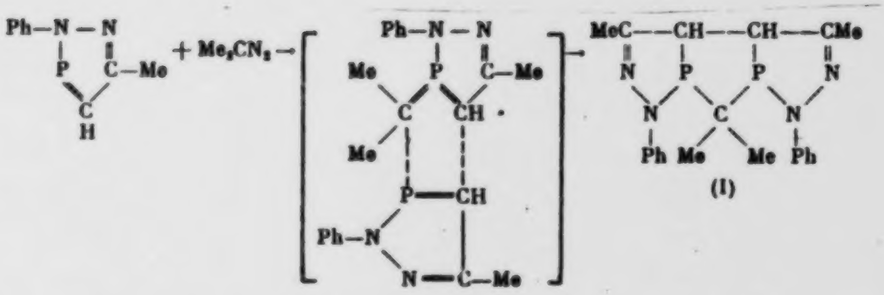
UDC 542.91:547.1'118:547.235.4

NEW PATHWAYS FOR REACTION BETWEEN DIAZAPHOSPHOLONES AND DIAZO COMPOUNDS

Moscow IZVESTIYA AKADEMII NAUK SSSR: SERIYA KHIMICHESKAYA in Russian No 5, May 82 (manuscript received 12 Jan 82) p 1196

ARBUZOV, B. A., DIANOVA, E. N. and GALEYEVA, I. Z., Chemical Institute imeni A. M. Butlerov, Kazan' State University imeni V. I. Ul'yanov-Lenin

[Abstract] Stable di-ylide structures can be prepared by reacting compounds containing acyclic substituted dicoordinated phosphorus with diazo compounds. Cyclic substituents in the above P compounds exist only as intermediate products. For the reaction of 2-phenyl-4-methyldiazaphospholes and diazopropane, a 1,3-dipolar cycloaddition across the P=C bond is observed as shown below:



Experimental conditions and structural conformations are given. References 3: 2 Russian, 1 Western.
[247-12027]

UDC 541.127 : 542.938 : 547.1'118

ALKALINE HYDROLYSIS KINETICS OF p-SUBSTITUTED PHENYL ESTERS OF DIMETHYLTHIONPHOSPHONIC ACID IN WATER-ACETONITRILE MIXTURES

Moscow IZVESTIYA AKADEMII NAUK SSSR: SERIYA KHIMICHESKAYA in Russian No 4, Apr 82 (manuscript received 30 Jun 81) pp 868-871

ZHDANKOVICH, Ye. L., ISTOMIN, B. I. (deceased) and VORONKOV, M. G., Irkutsk Institute of Organic Chemistry, Siberian Branch, USSR Academy of Sciences

[Abstract] Continuing their earlier studies of factors influencing nucleophyl substitution at the thiophosphinyl and carbonyl atoms, the authors studied a series of $Me_2P(S)OC_6H_4X$-p esters in water-acetonitrile mixtures at 25° C, and compared the results with analogous data for phenylacetates of MeC(O)-OC_6H_4X-p. Kinetics were studied in mixtures containing from 30 to 80 volume percent of MeCN. Measurements were made by spectrophotometry in pseudomonomolecular conditions with a excess of NaOH. Data were processed by computer using a multidimensional regression analysis program. Results showed that with increased amounts of MeCN, the rate of hydrolysis of all esters drops sharply with the second compound. With the first, this dependence is more complex, with ester hydrolysis passing through a minimum value at about 50% MeCN content. The authors suggest that the anion OH^- attacks the phosphorus atom to generate the limiting stage in alkaline hydrolysis of thiophosphinates. Figure 1; references 6 (Russian).
[215-12131]

UDC 542.91 : 547.1'118

THIOCYANIDES OF TRIVALENT PHOSPHORUS

Moscow IZVESTIYA AKADEMII NAUK SSSR: SERIYA KHIMICHESKAYA in Russian No 4, Apr 82 (manuscript received 1 Sep 81) pp 939-940

PUDOVIK, A. N., ROMANOV, G. V. and VOLKOVA, V. N., Institute of Organic and Physical Chemistry imeni A. Ye. Arbuzov, Kazan' Branch, USSR Academy of Sciences

[Abstract] Chloranhydrides of thiophosphorous and thiophosphonic acids with trimethylsilylcyanide form corresponding cyanides of trivalent phosphorus. The authors produced previously unstudied thiocyanides of P(III), determining structures by infrared-, Raman effect- and nuclear magnetic resonance of ^{31}P spectra, and compositions by element analysis. The experimental section gives details for producing dibutyldithiocyanophosphate, ethyl-S-isopropylthiocyanophosphonite, and S,S-dibutyl-(alpha-cyan-alpha-carbethoxy)dithiophosphite. Reference 1 (Russian).
[216-12131]

UDC 542.91 : 547.1'118

REACTION OF ESTERS OF DIPHENYLTHIOPHOSPHONIC ACID WITH DIPHENYLCHLOROPHOSPHINE

Moscow IZVESTIYA AKADEMII NAUK SSSR: SERIYA KHIMICHESKAYA in Russian No 4, Apr 82 (manuscript received 31 Jul 81) pp 951-952

AL'FONSOV, V. A., PUDOVIK, D. A., BATYYEVA, E. S. and PUDOVIK, A. N., Institute of Organic and Physical Chemistry imeni A. Ye. Arbuzov, Kazan' Branch, USSR Academy of Sciences

[Abstract] Since reactions of thioesters of phosphorus (III) with haloidophosphines had not previously been studied, the authors studied the reactions of the title compounds as derivatives of the same acid to avoid complicating the reaction with exchange processes between the thioalkyl group and the haloid. The reaction with thiophosphinite took place at 250° C without a solvent and brought formation of a mixture of tetraphenyldiphosphine, ethyldiphenylphosphine sulfide, and diphenylchlorophosphine sulfide. Nuclear magnetic resonance of ^{31}P and thin layer chromatography also revealed small quantities of S-ethyldiphenyldithiophosphinate. The second title compound reacted less completely and had less effect on isomerization in a related experiment. Details are given in an experimental section. References 9: 3 Russian, 6 Western.
[216-12131]

UDC 581.132+547.82

OXIDATION REACTION OF PHENYLPHOSPHATE AND HYDROQUINONEPHOSPHATE CAUSED BY HYDROGEN PEROXIDE IN PRESENCE OF COPPER IONS

Kiev DOKLADY AKADEMII NAUK UKRAINSKOY SSR, SERIYA B: GEOLOGICHESKIYE, KHIMICHESKIYE I BIOLOGICHESKIYE NAUKI in Russian No 3, Mar 82 (manuscript received 9 Nov 81) pp 40-42

MURADOV, A. Z. and YASNIKOV, A. A., corresponding member, UkSSR Academy of Sciences, Institute of Organic Chemistry, UkSSR Academy of Sciences

[Abstract] Seeking chemical models of biological conversions of phorphoric esters the authors studied the title reaction under aerobic and anaerobic conditions with 3.95 pH and temperature of 30-50° C. Oxidation speed was monitored by spectrophotometry and colorimetry: Spectral methods and thin layer chromatography revealed the formation of quinone in the reacting system. Small additions of allyl alcohol and acetonitrile markedly slowed the phenylphosphate reaction, while in anaerobic conditions quinone and hydroquinone speeded it. Results showed that phenylphosphate-Cu^{2+}-H_2O_2went through a stage in which hydroquinonephosphate formed. In a slow reaction, CuO^+ forms and hydroquinonephosphate oxidizes. Quinone speeds the reaction and Cu^{2+} is formed. Figures 4; references 4 (Russian).
[220-12131]

UDC 546.183 + 541.127

INDUCTIVE EFFECTS OF PHOSPHORUS-CONTAINING SUBSTITUTES

Kiev UKRAINSKIY KHIMICHESKIY ZHURNAL in Russian Vol 48, No 4, Apr 82 (manuscript received 6 Nov 80) pp 386-390

SUVALOVA, Ye. A., KASUKHIN, L. F., PONOMARCHUK, M. P., CHUDAKOVA, T. I., KLEPA, T. I., TUPCHIYENKO, S. K., DUDCHENKO, T. N. and GOLOLOBOV, Yu. G., Institute of Organic Chemistry, UkSSR Academy of Sciences

[Abstract] Donor-acceptor properties of the radicals $R_2P(Y)$- and $R_2P(Y)X$-, where Y is a heteroatom or an undivided pair of electrons and X is a cross-linking fragment (CH_2, O, S, NR, etc.) are important for predicting reaction capability of organic phosphorus compounds in chemical and biological processes. To expand knowledge of these properties, the authors used the Staudinger reaction to analyze a series of derivatives of the radical $(EtO)_2P(Y)X$-, evaluating σI_I parameters and their dependence on the nature of X and Y groupings. In all cases the first stage of the raction was limiting because of key reduction of P^{III} nucleophilicity by acceptor phosphorus-containing radicals. Thus all such substitutes are inductive electron acceptors. $(EtO)_2P(Y)O$ substitutes were stronger acceptors than their nitrogen analogs. The structures of the compounds obtained were determined by PMR and ^{31}P NMR, and infrared spectroscopy. Chemical details are given. References 18: 11 Russian, 7 Western.
[227-12131]

UDC 542.91:541.6:547.1'118

REACTION OF TRIMETHYLPHOSPHITE WITH p-DIMETHYLMINOBENZYLIDINE DERIVATIVES OF MONO- AND DICARBONYLIC COMPOUNDS

Leningrad ZHURNAL OBSHCHEY KHIMII in Russian Vol 52, No 5, May 82
(manuscript received 8 Jun 81) pp 1024-1029

ARBUZOV, B. A., POLEZHAYEVA, N. A., GALIASKAROVA, R. T., AGANOV, A. V. and KHAYAROV, A. I., Scientific Research Chemical Institute imeni A. M. Butlerov of the Kazan' State University imeni V. I. Ul'yanov-Lenin

[Abstract] Conditions are described for the synthesis of phosphoranes by the reaction of p-dimethylaminobenzylidineacetylacetone and -benzoylacetone with trimethylphosphite to yield 2,2,2-trimethoxy-3-p-dimethylaminophenyl-4-acetyl-5-methyl-1,2-oxaphosphalene and -5-phenyl-1,2-oxaphosphalene in the form of crystals with respective melting points of 83-88 and 103-108°C. The products were stable compounds which did not undergo transformation in betaines as seen with 1,3,2-oxazaphospha(P^V)lenes and failed to alkylate tertiary amines. These benzylidine derivatives of the β-ketones react with $P(OCH_3)_3$ in the presence of CH_3COOH to yield phosphonates. References 10: 2 Western, 8 Russian.
[253-12172]

UDC 547.491.6.26'118

REACTION OF DIALKYLCYANOPHOSPHITES WITH CARBONYLIC COMPOUNDS

Leningrad ZHURNAL OBSHCHEY KHIMII in Russian Vol 52, No 5, May 82
(manuscript received 27 Mar 81) pp 1029-1032

PUDOVIK, A. N., ROMANOV, G. V. and VOLKOVA, V. N., Institute of Organic and Physical Chemistry, Kazan' Branch, USSR Academy of Sciences

[Abstract] Dialkylcyanophosphites were found to react with ketones only in the presence of catalytic quantites of triethylamine, with the formation of the corresponding dialkyl(-cyanoalkyl)phosphites. Furthermore, the catalytic effects of HCN were explained by the fact that the reaction initially involved the formation of cyanochydrin, which subsequently reacted with the cyanophosphites in a nucleophilic substitution reaction with the regeneration of HCN. Figures 1; references 9 (Russian).
[253-12172]

UDC 547.26'118

σ^{ϕ}. CONSTANTS OF CYCLIC FRAGMENTS OF IMIDOPHOSPHORIC COMPOUNDS

Leningrad ZHURNAL OBSHCHEY KHIMII in Russian Vol 52, No 5, May 82
(manuscript received 23 Apr 81) pp 1033-1039

KABACHNIK, M. I., TIKHONINA, N. A., GILYAROV, V. A., KOROLEV, B. A., PUDOVIK, M. A., KIBARDINA, L, K. and PUDOVIK, A. N., Institute of Heteroorganic Compounds, USSR Academy of Sciences; Institute of Organic and Physical Chemistry imeni A. Ye. Arbuzov, Kazan' Branch, USSR Academy of Sciences

[Abstract] Contradictions in the published data on the values of the constants of dioxaphospholane and dioxaphosphorinane fragments of imidophosphoric compounds led to the determination of these constants for the phosphorus-free fragments of 2-p-fluorophenylimino-1,3,2-dioxaphospholanes (on the basis of σ_F values), and of 2-phenylimino- (or p-fluorphenylimino)-1,3,2-oxazophospholanes and 2-dialkylamino (on the basis of pK_a ($MeNO_2$) and $_F$ values). The σ^{ϕ}. constants were found to vary with the reaction medium, which seriously limits the use of correlation analysis in the chemistry of the heterophosphoric ring. References 13: 1 Western, 12 Russian.
[253-12172]

UDC 547.315.1.3

REACTION OF PHOSPHORYLATED ALLENES WITH SULFENYLCHLORIDES

Leningrad ZHURNAL OBSHCHEY KHIMII in Russian Vol 52, No 5, May 82
(manuscript received 2 Jun 81) pp 1040-1045

KHUSAINOVA, N. G., NAUMOVA, L. V., BERDNIKOV, Ye. A. and PUDOVIK, A. N., Kazan' State University imeni V. I. Ul'yanov-Lenin

[Abstract] Since the interaction of sulfenylchlorides (I) with cumulene systems has not received adequate attention, this form of electrophilic addition was investigated by evaluating the effects of substituents on the phosphorus fragment and on the γ cumulene carbon in the reaction of I with phosphorylated allenes. Evaluation of the NMR and the PMR spectra demonstrated that, depending on the substituents, both linear and cyclic products are formed. The postulated mechanism involves an electrophilic trans-attack of I on the central carbon atom of the phosphorylated allene which is enhanced by the nucleophilicity of the phosphoryl group oxygen. This leads to the formation of a quasiphosphonium intermediate (II). A subsequent nucleophilic attack by the chloride ion on the electrophilic center of II determines whether a linear or a cyclic structure is formed, depending on the substituents. Figures 2; references 11: 1 Western, 1 Bulgarian, 9 Russian.
[253-12172]

UDC 541.67:547.26'118

DIPOLE MOMENTS OF ORGANOPHOSPHORUS COMPOUNDS, PART 21: CONFORMATION OF ALLENYL DERIVATIVES OF TETRACOORDINATED PHOSPHORUS

Leningrad ZHURNAL OBSHCHEY KHIMII in Russian Vol 52, No 5, May 82
(manuscript received 7 Jul 81) pp 1045-1048

PATSANOVSKIY, I. I., STRELKOVA, Ye. N., ISHMAYEVA, E. A., REMIZOV, A. B., KHUSAINOVA, N. G., NAUMOVA, L. V. and PUDOVIK, A. N., Kazan' State University imeni V. I. Ul'yanov-Lenin

[Abstract] Investigations were conducted on the rotational isomerism of dimethyl(3-methyl-1,2-butadienyl)phosphine oxide, and 3-methyl-1,2-butadienephosphonate chloride and propanedienephosphonate chloride, employing IR and Raman spectroscopies, evaluation of the dipole moments, and the Kerr effect. The resultant findings on the isomerism relative to the P-C(sp^2) bond indicated that these compounds attain a cis-trans conformational equilibrium. Figures 1; references 22: 1 Bulgarian, 5 Western, 18 Russian.
[253-12172]

UDC 547.76

2-ALKOXY(2-DIALKYLAMINO)-1,3,2-DIOXAPHOSPHOLENES

Leningrad ZHURNAL OBSHCHEY KHIMII in Russian Vol 52, No 5, May 82
(manuscript received 28 Jul 81) pp 1049-1054

KUDRYAVTSEVA, T. N., KARLSTEDT, N. B., PROSKURNINA, M. V., BOGANOVA, N. V., SHESTAKOVA, T. G. and LUTSENKO, I. F., Moscow State University imeni M. V. Lomonosov

[Abstract] Conditions are described for the synthesis and identification of 2-alkoxy- and 2-dialkylamino-1,3,2-dioxaphospholenes by the reaction of bis-1,2-trimethylsioloxyalkenes with alkyldichlorophosphites containing a ring with a tri- or tetracoordinated phosphorus. The 2-alkoxy-1,3,2-dioxaphospholene products reacted poorly with electrophilic reagents (mercury oxide, isoamylnitrite, iodobenzene, dimethyl sulfoxide). References 13: 5 Russian, 8 Western.
[253-12172]

UDC 547.241

EFFECTS OF SPATIAL HINDRANCE OF INTERACTION BETWEEN DIALKYLCHLOROPHOSPHINES AND THIOPHOSPHONOUS ACIDS AND THEIR SALTS

Leningrad ZHURNAL OBSHCHEY KHIMII in Russian Vol 52, No 5, May 82
(manuscript received 20 Jul 81) pp 1054-1062

FOSS, V. L., KUKHMISTEROV, P. L. and LUTSENKO, I. F., Moscow State University imeni M. V. Lomonosov

[Abstract] Studies were undertaken to identify the most convenient approach for the preparation of tetraalkyldiphosphine monothiooxides (RR'P(S)PRR'; I) and phosphonous acid thioanhydride (RR'P-S-PRR'; II) isomers, which involved investigation of the following reactions: a) RR'PSNa + RR'PCl → I and/or II; b) RR'P(S)H + RR'PCL → II and/or I; and c) RR'P-PRR' + S → I, where R and R' represent Bu, i-Bu, i-Pr, or t-Bu in various combinations. Since steric factors significantly influenced the thermodynamic stability of I and II, evaluation of spatial impediments in the kinetics between isomers was difficult because of possible mutual rearranagements in I and II, especially in the presence of thiophosphonous acid salts. The resultant analysis of the products showed that (c) was the most convenient approach for securing even the most unstable I compounds. Products prepared in this manner do not contain catalytic admixtures and can be stored for several months at 0°C. Synthesis in this manner is particularly significant because none of the I compounds, regardless of their thermodynamic stability, can be purified by distillation since heating leads to the establishment of a redox equilibrium. References 13: 5 Russian, 8 Western.
[253-12172]

UDC 547.241

REARRANGEMENT OF THIOPHOSPHONOUS ACID ANHYDRIDES AND THEIR ISOMERIC TETRAALKYLDIPHOSPHINE THIOOXIDES

Leningrad ZHURNAL OBSHCHEY KHIMII in Russian Vol 52, No 5, May 82
(manuscript 15 Jun 81) pp 1063-1067

FOSS, V. L., KUKHMISTEROV, P. L., and LUTSENKO, I. F., Moscow State University imeni M. V. Lomonosov

[Abstract] NMR-^{31}P studies were conducted on a number of thiophosphonous acid anhydrides (I) and tetraalkyldiphosphine thiooxide isomers (II) to determine the effect of steric factors on their thermodynamic stability and the limits of phosphotropic isomerism. The findings indicated that the thermodynamic stability of I, with respect to their II isomers, increase sharply as the bulkiness of the radicals on the P atom increases. The size of the substituents had a more pronounced effect on the destabilization of

II than on I, and in general showed greater spatial impediments than in the case of their oxygen congeners. This may have been related to the fact that the energy of dissociation of the thiophosphoryl group is much lower than that of the phosphoryl group and, consequently, the P=S group is much more easily destabilized. References 7: 3 Western, 4 Russian.
[253-12172]

UDC 6'118

PHOSPHORYLATION OF TRIPHENYLPHOSPHAZOHYDRIDE, PART 2

Leningrad ZHURNAL OBSHCHEY KHIMII in Russian Vol 52, No 5, May 82 (manuscript received 8 Oct 81) pp 1081-1085

ZASORINA, V. A., SHTEPANEK, A. S. and PINCHUK, A. M., Institute of Organic Chemistry, Ukrainian SSR Academy of Sciences

[Abstract] Conditions are described for the phosphorylation of triphenylphosphazohydride by phosphoryl chloride, trichlorophosphazophenylsulfonyl, and by phenyldichlorophosphazophenylsulfonyl. Evaluation of the IR spectra and chemical reactivities of the products in which one, two, or three Cl atoms were replaced by the triphenylphosphazo group showed that these compounds were fairly stable to humidity in the air but decomposed on boiling in water. The mono- and dichloroanhydrides failed to react with alcohols or phenols even under extreme conditions, but reacted with phenolates, ammonia, and aromatic and aliphatic amines. Crown ethers containing the phosphazo radicals were formed by reaction of the dichloroanhydrides with bis[2-(O-oxyphenoxyl)ethyl diphenolates. References 4 (Russian).
[253-12172]

UDC 547.558.1

DYAD PHOSPHORUS-CARBON TAUTOMERISM: [(DIPHENYLPHOSPHORANYLIDENE)TOSYLMETHYL] TRIPHENYLPHOSPHONIUM CHLORIDE

Leningrad ZHURNAL OBSHCHEY KHIMII in Russian Vol 52, No 5, May 82 (manuscript received 28 Jul 81) pp 1095-1099

ALADZHEVA, I. M., BYKHOVSKAYA, O. V., PETROVSKIY, P. V. and MASTRYUKOVA, T. A., Institute of Heteroorganic Compounds imeni A. N. Nesmeyanov, USSR Academy of Sciences

[Abstract] Studies were conducted on the dyad phosphorus-carbon tautomerism in a system containing triphenylphosphonium and tosyl groups. [(Diphenyphosphino)tosylmethylene]triphenylphosphoran (I) was synthesized by the reaction of triphenyltosylmethylphosphonium bromide with diphenylbromophosphine in the presence of triethylamine. NMR-^{31}P studies showed that protonation of I

resulted in the formation only of the mesomeric I-phosphonium salt regardless of the acid and solvent, i.e., the tautomeric equilibrium was shifted completely to the formation of the PH form. Treatment of I with a large excess of HCl resulted in the formation of a diprotonated product in which the second proton was added to the central carbon atom. References 8: 4 Western, 4 Russian.
[253-12172]

UDC 547.558.1:547.8

PHENOPHOSPHAZINES, PART 6: SYNTHESIS OF DIMETHYLAMINOPROPYL-CONTAINING COMPOUNDS

Leningrad ZHURNAL OBSHCHEY KHIMII in Russian Vol 52, No 5, May 82
(manuscript received 10 Aug 81) pp 1099-1103

DEMIDOVA, N. I., BOKANOV, A. I., MEDVEDEV, O. S., and STEPANOV, B. I.,
Moscow Institute of Chemical Engineering imeni D. I. Mendeleyev

[Abstract] In view of the therapeutic usefulness of many phenothiazines, further studies were conducted on the synthesis of seven new dihydrophenophosphazines containing the dimethylaminopropyl group bound to the heterocyclic ring via the N atom or the P atom. The results showed that three such compounds (10-(3-dimethylaminopropyl)-10-thiono-5,10-dihydrophenophosphazine, 5-(3-dimethylaminopropyl)-10-phenyl-10-thiono-4,10-dihydrophenophosphazine, 5-(3-dimethylaminopropyl)-10-phenyl-5,10-dihydrophenophosphazine) induced transient hypotension and bradycardia when administered to experimental animals (unspecified) with myocardial infarctions. References 8: 3 Western, 5 Russian.
[253-12172]

UDC 547.241

INTERACTION OF HYDROXYALKYLAMINO(HYDRAZINO)SYMM.TRIAZINES WITH PHOSPHORIC ACID ISOCYANATES

Leningrad ZHURNAL OBSHCHEY KHIMII in Russian Vol 52, No 5, May 82
(manuscript received 8 Dec 81) pp 1103-1108

KULIKOVA, O. A., RAZVODOVSKAYA, L. V. and MEL'NIKOV, N. N., All-Union Scientific Research Institute of Chemical Plant Protection

[Abstract] As part of a search for biologically-active compounds, studies are described on the reaction of hydroxyalkylamino- and hydroxyalkylhydrazine-symm.triazines with isocyanates of phosphoric and thiophosphoric acids. The results showed that reaction of 0,0-diethylphosphoric and 0,0-diethylthiophosphoric acids with 2-hydroxyethylamino-,2-hydroxy-1-propylamino-, and

1-hydroxy-2-butylamino-symm.-triazines resulted in the formation of the corresponding phosphorylated carbamoyloxyalkylamino-symm.-triazines. Carbamoylation of symm.-triazinyl-chloralamides with phosphoryl isocyanates results in the formation of phosphorylate aminals. References 5 (Russian).
[253-12172]

UDC 547.241

PHOSPHORUS-CONTAINING SYMM.-TRIAZINYLUREAS

Leningrad ZHURNAL OBSHCHEY KHIMII in Russian Vol 52, No 5, May 82
(manuscript received 21 Jul 81) pp 1108-1112

KULIKOVA, O. A., RAZVODOVSKAYA, L. V., MEL'NIKOV, N. N. and NEGREBETSKIY, V. V., All-Union Scientific Research Institute of Chemical Plant Protection

[Abstract] As part of a search for biologically-active compounds, studies were conducted on the carbamoylation of amino-symm.-triazines by phosphoric acid isocyanates. The investigations showed that reaction of the isocyanates of 0,0-diethylphosphoric and 0,0-diethylthiophosphoric acids with substituted amino-symm.-triazines yielded phosphorylated symm.-triazinylureas. PMR studies revealed that tautomeric equilibrium prevails between many of the phosphorylated symm.-triazinylureas. References 4: 1 Western, 3 Russian.
[253-12172]

UDC 542.91:547.1'118

ORGANOPHOSPHORUS DERIVATIVES OF CERTAIN N-SUBSTITUTED LACTAMS

Leningrad ZHURNAL OBSHCHEY KHIMII in Russian Vol 52, No 5, May 82
(manuscript received 15 Jun 81) pp 1113-1116

GRECHKIN, N. P. and GRISHINA, L. N., Institute of Organic and Physical Chemistry imeni A. Ye. Arbuzov, Kazan' Branch, USSR Academy of Sciences

[Abstract] Since the N-substituted derivatives of lactams possess various physiological activities, studies on the further synthesis of such agents involved synthesis of organophosphorus derivatives by the reaction of the acid chlorides of dialkylphosphides and glycolphosphides with 1-(2-hydroxy-1-aza-1-cyclopentyl)-2,2,2-trichloroethanol or 1-(2-hydroxy-1-aza-cycloheptyl)-2,2,2-trichloroethanol in the presence of Et_3N to yield the corresponding 1(2- oxy-1-aza-cycloalkyl)-2,2,2-trichloethyl esters. The structures of the products were confirmed by IR and NMR-^{31}P spectroscopies and chemical analyses. Reaction of the resultant esters with dry hydrogen chloride resulted in an Arbuzov rearrangement, with isolation and identification of the products. References 8: 3 Western, 5 Russian.
[253-12172]

UDC 547.26'.118

STABLE TRIFLUOROACYLPHOSPHITE

Leningrad ZHURNAL OBSHCHEY KHIMII in Russian Vol 52, No 5, May 82
(manuscript received 21 Nov 81) p 1206

KONOVALOVA, I. V., MIRONOV, V. F., OFITSEROV, Ye. N. and PUDOVIK, A. N.,
Kazan' State University imeni V. I. Ul'yanov-Lenin

[Abstract] Conditions are described for the preparation of stable trifluoroacylphosphite by the reaction of diisopropylchlorophosphite with trifluoroacetate in pentane for 2 h with heating. The solvent was removed under vacuum, and the product was distilled under 12 mmHg to yield a colorless hygroscopic liquid with a 53-53.5°C bp. References 3: 1 Western, 2 Russian.
[253-12172]

UDC 541.138.2

ELECTROCHEMICAL FLUORINATION OF MONOAMIDOPHOSPHITES

Leningrad ZHURNAL OBSHCHEY KHIMII in Russian Vol 52, No 5, May 82
(manuscript received 10 Nov 81) p 1207

NIKITIN, Ye. V., IGNAT'YEV, Yu. A., ROMAKHIN, A. S., PARAKIN, O. V., ROMANOV, G. V., KARGIN, Yu. M. and PUDOVIK, A. N., Kazan' State University imeni V. I. Ul'yanov-Lenin; Institute of Organic and Physical Chemistry imeni A. Ye. Arbuzov, Kazan' Branch, USSR Academy of Sciences

[Abstract] Techniques previously described were used for the electrochemical fluorination of the monoamidophosphites $Et_2NP(OEt)_2$ and $Bu_2NP(OBu)_2$ during their oxidation on the anode in acetonitrile. Following electrolysis 0,0-dialkylfuorophosphates $(EtO)_2P(O)F$ and $(BuO)_2P(O)F$ were isolated, the structures of which were confirmed by NMR ^{31}P and ^{19}F spectroscopies. References 2 (Russian).
[253-12172]

PESTICIDES

CHEMICAL ASSOCIATION COMPLAINS ABOUT UNRETURNED BARRELS

Moscow SOTSIALISTICHESKAYA INDUSTRIYA in Russian 19 Jun 82 p 2

[Article by A. Yumagulov, deputy to the USSR Supreme Soviet, and R. Bagabov and R. Galimov, instrument controllers of the Ufa "Khimprom" Association: "Where Are the Barrels Rolling?"]

[Text] For many of our brigades, the work day begins with telephone calls: The brigade leaders are running out of containers. First we shake up the executives of the repair shop. They are "our own," and we have power over them. But they can only shrug their shoulders: There is nothing to repair. Then we reach our suppliers. They wearily reject our pleas: "You're barking up the wrong tree, it's 'Sel'khozkhimiya' that's guilty--it returned 75,000 barrels less this month, we're doing everything we can, it's the fault of the clients...."

Meanwhile the shops stand idle because there is nothing to put the finished products in, finished products being awaited anxiously by the grain fields--herbicides.

According to instructions approved by the USSR Gossnab and the State Arbitration Commission, subdivisions of the All-Union "Soyuzsel'khozkhimiya" Association must return 60 percent of the iron barrels for reuse. But the empty barrels roll in the totally opposite direction. Soyuzsel'khozkhimiya failed to return 12,000 barrels from Tambovskaya Oblast, 9,000 from the Tatar SSR and almost 6,000 from Chitinskaya Oblast. And it is hard to count the number of organizations that have failed to return 3,000-4,000 barrels each.

We send herbicides for thousands of kolkhozes and sovkhozes to 655 addresses. But the containers have never been returned in the quantities foreseen by the instructions. Our consumers turn a deaf ear when we ask them to return the containers.

Of course, our association does more than just wait around. Last year we sued "Soyuzsel'khozkhimiya" subdivisions for fines totaling almost a million rubles. We have recently prepared documents to impose more fines on them totaling almost 500,000 rubles. But nevertheless hundreds of thousands of barrels have never been returned.

Sometimes it also happens that we manage to wrest some barrels away, but they are returned with broken spouts or with dents and punctures which cannot be repaired. We are forced to throw up to 150,000 such barrels onto the scrap heap each year.

We suggest immediately making an amendment to the instructions prohibiting our clients from receiving credit for faulty barrels which cannot be repaired and which cannot be used for our products. We also believe it necessary to recall to our unconscientious partners how much significance is attached to timely provision of containers in the necessary quantities in the USSR Food Program. After all, were more packaging available, we could provide thousands of tons more of highly effective herbicides to treat the most diverse crops.

11004
CSO: 1841/261

MOLDAVIAN CHEMICAL INSTITUTE SYNTHESIZES ANTITRANSPIRANTS

Kishinev SOVETSKAYA MOLDAVIYA in Russian 10 Jun 82 p 4

[Article by B. Borisov: "Modeling a Molecule"]

> [Text] The Laboratory of Plant Growth and Development Regulator Chemistry of the Institute of Chemistry, Moldavian SSR Academy of Sciences has synthesized antitranspirants--active substances that raise the drought and frost resistance of cultivated plants.

The colleagues of this laboratory are working on a highly practical problem: They are creating new substances capable of actively influencing plants. Whatever for?

"Were you to assume that absolute ecological equilibrium reigns in the plant world, you'd be right to phrase the question in that way," said the laboratory director, Candidate of Chemical Sciences Dmitriy Pavlovich Popa. "But unfortunately as a result of man's intense economic activity this equilibrium is being seriously disturbed. Moreover we cannot give in to the surprises of weather; we cannot rely wholly upon the possibilities nature has to offer."

And so the chemists were given the task of synthesizing substances which could ensure acquisition of regularly high yields no matter how unfavorable the weather and the climatic conditions. It should be noted that this is an especially important problem in Moldavia.

Yields depend on many factors. However, moisture rightfully occupies a special place among them. As we know, there are certain ways to compensate for a lack of moisture. Artificial irrigation as an example. Nevertheless a moisture shortage cannot be solved just by irrigation. And so the scientists suggested the idea of influencing plants by regulating their transpiration. This physiological process of evaporation of water by living plants in a sense contributes to a continuous flow of water within the plant. With its help, water and nutrients are absorbed from the soil and, moreover, plants are protected from overheating.

Tiny stomata that are located on leaves and which regulate transpiration pump enormous quantities of moisture into the atmosphere. A mature birch tree, for example, releases up to 70 liters of water into the atmosphere in just a single day.

K. A. Timiryazev uncovered the nature of drought resistance in his time. Transpiration is unavoidable, he wrote, since a plant must periodically open its stomata in order to let carbon dioxide penetrate into its cells.

But would it be possible, the scientists wondered, to make the stomata close at man's will? For example in periods of especially sultry weather, when evaporation becomes especially intensive and as a consequence the plant inevitably suffers? Apparently so, if substances could be found which influence the hormone system "responsible" for transpiration in the plant.

As we know, all hormones operate according to the "lock and key" principle. There are substances which, using the terminology of physiology, repress a hormone--that is, "lock" it up, making it inactive. And there are others which "release" it.

The task of the researchers was to "build" a key which could be used to "unlock" or "lock" a hormone. Knowing the mechanism of action of a concrete hormone, they created a mathematical model of its molecule. Moreover, a different molecular model was created for each plant.

The search was graced with success. After testing dozens of synthesized compounds the laboratory found several active substances, which they termed antitranspirants.

Experiments conducted by colleagues of the laboratory jointly with colleagues of the "Dnestr," "Selektsiya" and "Kodru" scientific-production associations and with producers of the "Pamyat' Il'ichu" Interkolkhoz Orchard showed that after plants were processed by the synthesized substances, intensity of transpiration decreased by about 50 percent. It is noteworthy that use of these substances was not detrimental to photosynthesis; the yield even increased by 20-30 percent. Crops such as potatoes and beets were found to be especially receptive to the influence of antitranspirants. In comparison with a control group, their sugar content even grew.

"Now the scientists have to thoroughly study the mechanism of action of the synthesized substances upon different cellular organelles," explained laboratory director D. P. Popa. "In particular, we are conducting this research in close interaction with colleagues of the Institute of Plant Physiology and Biochemistry. There are numerous questions, and all of them are extremely interesting. Why for example does photosynthesis not suffer when transpiration is curtailed? Where, in what deep-lying layers of the cell, is moisture stored? By answering these and many other questions, we will be able to influence transpiration with incomparably greater effectiveness, and arm the producers with stricter and more accurate plant growing procedures."

11004
CSO: 1841/261

UDC 542.91:547.512

SYNTHESIS OF SOME C-10-ISOPRENOID ALCOHOLS CONTAINING ONE THREE-MEMBERED RING

Moscow IZVESTIYA AKADEMII NAUK SSSR: SERIYA KHIMICHESKAYA in Russian No 5, May 82 (manuscript received 4 Aug 81) pp 1088-1091)

MOISEYENKOV, A. M., CHESKIS, B. A., RUBASHEVSKAYA, T. Yu., NESMEYANOVA, O. A. and SEMENOVSKIY, A. V. (deceased), Institute of Organic Chemistry imeni N. D. Zelinskiy, USSR Academy of Sciences, Moscow

[Abstract] Two methods are described for synthesizing a series of cyclopropyl-containing monoterpenoid isoprenoids. The first path proceeds via the reaction of lithium dimethylcyclopropane (I) or lithium dimethylcyclopropene (II) with trans-1,2-bromohydrine (III) resulting in about 40% conversion to product. (II) can also react with 1,2-epoxyisopropene forming a mixture of isomers. The second method is the Grignard syn-addition of β,β -dimethylmagnesium chloride and formaldehyde to 1-methylcyclopropene, yielding about 60% conversion. The latter reaction apparently proceeds through a 6-membered ring transition state which preserved the stereochemistry. Details of the synthesis and structural confirmations are given. Figures 2; references 15: 3 Russian, 12 Western.
[247-12027]

PETROLEUM PROCESSING TECHNOLOGY

UDC 665.765-404.038

JOINT EFFECTS OF DITHIOPHOSPHORIC ACID ESTER AND ANTIOXIDANTS ON PERFORMANCE PROPERTIES OF MINERAL OIL

Moscow KHIMIYA I TEKHNOLOGIYA TOPLIV I MASEL in Russian No 5, May 82 pp 22-23

BORSHCHEVSKIY, S. B., SHABANOVA, Ye. V., ZAGORODNYY, N. G. and TROFIMOV, G. A., All-Union Scientific Research Institute for Oil Production

[Abstract] High temperatures, catalytic effects of metals and environmental oxidation bring significant changes in lubricating oils. The authors studied joint effects of the methylbenzyl ester of diisobutyldithiophorphoric acid and various phenol and amine antioxidant additives. At 200° C, 2,2-methylene-bis(4-methyl-6-tert-butylphenol) and 2,6-di(tert-butyl)-4-methylphenol had a prooxidational effect, while 4,4-methylene-bis[2,6(tert-butyl)phenol], phenol-alpha-naphthylamine and the mixed products of phenol alkylation by styrene (AO-20) inhibited oxidation. AO-20 reduced the methylbenzyl ester's pro-oxidational action, while the others had little effect. At 180° C in the presence of copper, all tested antioxidants but AO-20 inhibited oxidation and the methylbenzyl ester increased that action. Little change was noted in the M-11 lubricating oil tested because of the additives. The combination of AO-20 and the ester improved antiwear, antiscratch and antioxidation properties better than other combinations. Figures 2; references 4 (Russian). [240-12131]

UDC 662.67

CURRENT STATE AND PROSPECTS FOR USING OIL SHALES IN ENERGY AND TECHNOLOGY

Moscow KHIMIYA TVERDOGO TOPLIVA in Russian No 3, May-Jun 82
(manuscript received 31 Jul 80) pp 26-34

TYAGUNOV, B. I., STEL'MAKH, G. P., CHIKUL, V. I., GAVRILIN, A. V., ARANOVICH, Yu. V. (deceased) and DOLGOPOLOV, B. M., State Scientific Research Institute for Energy imeni G. M. Krzhizhanovskiy

[Abstract] The authors review reserves and development of oil shale worldwide and in the USSR, where known and estimated reserves approximate a trillon tons. Serious technical difficulties related to sulfur and fly ash pollution

are being attacked by chemical processing to obtain shale tar and other useful products. In the USSR, thermal processing of pulverized oil shale, involving mixing with a solid ash at 800° C in the absence of air, is used to obtain shale tar and gas. A two-stage process is being developed for low-content shales and those with little volatile gas yield. Oil-shale processes are conducted above ground and underground; most common methods are done above ground due to the difficulty in regulating underground processes, their probable pulluting of ground water and low heat from the gases obtained. Yet capital investment advantages, avoidance of tailing disposal problems, and other advantages make underground processing a target for development in the future, particularly in the United States. In the USSR, menilite deposits in the Carpathians offer both energy and building material raw materials. Technological problems of acquisition, ecological protection and utilization stand in the way of full realization of these resources. References 11:
8 Russian, 1 Ukrainian, 2 English.
[246-12131]

PHARMACOLOGY AND TOXICOLOGY

UDC 547.822.412.6

SYNTHESIS AND BIOLOGICAL ACTIVITY OF DERIVATIVES OF 2,6-DIMETHYL-3,5-DICARBETHOXY-1,4-DIHYDROPYRIDINE

Yerevan ARMYANSKIY KHIMICHESKIY ZHURNAL in Russian Vol 35, No 3, Mar 82
(manuscript received 7 May 80) pp 178-181

YESAYAN, Z V., CHSHMARITYAN, S. G., APOYAN, N. A. and PAPAYAN, G. L.,
Institute of Fine Organic Chemistry imeni A. L. Mndzhoyan, ArSSR Academy of
Sciences, Yerevan

[Abstract] The authors synthesized the title derivatives and determined their composition and structure by infrared and mass spectroscopy. They then studied their antiphlogistic and fever reducing properties in rats. Results indicated that 2,6-dimethyl-3,5-dicarbethoxy-4-(3-pyridyl)-1,4-dihydropyridine and the di-diethylaminoethyl ester of 2,6-dimethyl-4-(3-pyridine)-1,4-dihydropyridine-3,5-dicarbonic acid had some antiphlogistic activity in 50 and 100 mg/kg doses, while related dihydrazides suppressed motor activity and caused catelepsy and hypothermia. Chemical details are given in the experimental section. References 7: 6 Russian, 1 Western.
[243-12131]

POLYMERS AND POLYMERIZATION

UDC 541.124 : 541.15 : 541.64

MECHANISM OF RADIATION ION GRAFT POLYMERIZATION

Moscow IZVESTIYA AKADEMII NAUK SSSR: SERIYA KHIMICHESKAYA in Russian No 4, Apr 82 (manuscript received 2 Nov 81) pp 875-881

KABANOV, V. Ya., ALIYEV, R. E., KUDRYAVTSEV, Val. N., SIDOROVA, L. P. and SPITSYN, V. I., Institute of Physical Chemistry, USSR Academy of Sciences, Moscow

[Abstract] Previously the authors showed that radiation grafting could be done by the ion mechanism as well as the radical mechanism (DOKLADY AN SSSR, 1971). In this study they examine the mechanism of triggering ion graft polymerization, taking into account the frequency heterogeneity of the grafting process. They point out that the ion process in radiolysis has received much less attention than the behavior of radicals, and discuss these factors for polyolefins. Data on the effects of solvents showed a correlation between solvent donor numbers and the rate of grafting, and a complete lack of correlation with other properties of solvents. For radiation ion grafting, polymer swelling in the solvent has less importance than the solvent's donor-acceptor properties. Ion grafting reaches its greatest speed at the glass point of the swelled polymer. Results showed that the solvent's effect on copolymer composition is strikingly different as the amount of solvent is increased. A formula is developed for the dependence of the ion process's contribution on the strength of the solvent dose and the content of inhibiting impurities (such as water) in the system. Figures 4; references 9: 7 Russian, 2 English.
[216-12131]

UDC 541.64 : 546.41

CHEMICAL MODIFICATION OF SURFACE OF CALCIUM CARBONATE WITH 4-AZO-BIS-4-CYANOPENTANIC ACID AND ITS EFFECT ON TRIGGERING AND POLYMERIZATION REACTIONS

Moscow VYSOKOMOLEKULYARNYYE SOYEDINENIYA in Russian Vol 24, No 4, Apr 82
(manuscript received 8 Sep 80) pp 729-734

POPOV, V. A., ZVEREVA, Yu. A., KLIMOV, Ye. S., PALAYEVA, T. V. and
GRISHIN, A. N.

[Abstract] Chemical modifications have previously been shown to improve properties of compositional materials; surface activation and chemical grafting were shown to have a noticeable effect on thermal decomposition. In the present study, the authors studied adsorption of the title acid (ACK) on the surface of calcium carbonate (chalk) and kinetic features of triggering and polymerization of various monomers on the surfaces of filler-carriers of active triggering centers. Reactions were conducted in methanol in the presence of small amounts of water, with chalk in a 20% suspension in a nitrogen stream being mixed into the mass. The thermal decomposition of ACK and its calcium salt were studied in DMF by the nitrogen emission rate; polymerization of methylmethacrylate and acrylonitrile were studied by a dilatometric method, and vinylchloride, by an ampule incubator method. Results showed that chemical adsorption of triggering agents on solid phase surfaces can make major changes in kinetic parameters of all elementary polymerization reactions. Polymerization on filler-carriers was accompanied by microcapsulation of fillers, depending on the nature of trigger agent grafting, monomer type, thermodynamic reaction of the polymer with the reactive medium and diffusion effects. Figures 5; references 18: 13 Russian, 5 Western.
[228-12131]

UDC 541.64 : 547.315

STABILIZATION OF POLYVINYL CHLORIDE WITH CONJUGATED DIENES

Moscow VYSOKOMOLEKULYARNYYE SOYEDINENIYA in Russian Vol 24, No 4, Apr 82
(manuscript received 11 Nov 80) pp 793-800

MINSKER, K. S., KOLESOV, S. V., PETROV, V. V. and BERLIN, Al. Al., Bashkir
State University imeni 40th Anniversary of October

[Abstract] A possible means of stabilizing PVC (which contains carbonylallyl groups which lower the thermostability of the polymer) involves breaking the conjugation chain in those groups and saturation of the C=C bonds (thus liquidating their accelerating action on the breakdown of adjacent vinyl chloride chains). This bond saturation through gentle chlorination or phosphorylation also increased thermal stability reducing carbonylallyl groups in chlorine macromolecules reduces the initial rate of dehydrochlorination of PVC modified by conjugated dienes. Regeneration of these groups speeds

elimination of HCl right up to the original status of PVC. The thermal stability of carbonylallyl group adducts and conjugated dienes depends on the nature of the diene and in general is markedly higher than that of unstabilized groups. PVC destruction in mixtures with dienes depends on the Diels-Alder reaction balance. In contrast, in the presence of a diene at the destruction temperature a balance is achieved between adducts and $-C(O)-(OCH{=}CH-)_n-$ groups that activate polyene growth during polymer decomposition. In the presence of octatriene-1,3,6, sorbic acid, methylsorbate and hexachlorocyclopentadiene, the initial rate of HCl elimination from PVC decreases, as it does with the compounds previously discussed. Conjugated dienes do not inhibit thermal decomposition of PVC previously degradated in a vacuum. Figures 4; references 8 (Russian).
[228-12131]

UDC 541.64 : 537.31

ANOMALIES IN DEPENDENCE OF ELECTRICAL CONDUCTIVITY OF POLYMER ION-RADICAL SALTS OF 7,7,8,8-TETRACYANOQUINODIMETHANE ON STRUCTURE OF ALIPHATIC IONENE POLYCATION

Moscow VYSOKOMOLEKULYARNYYE SOYEDINENIYA in Russian Vol 24, No 4, Apr 82 (manuscript received 18 Nov 80) pp 801-806

MOSTOVOY, R. M., BERENDYAYEV, V. I., VASHKEVICH, V. A., KOTOV, B. V., ZUBOV, Yu. A., OVCHINNIKOV, S. Yu., TVERSKOY, V. A. and PRAVEDNIKOV, A. N., Scientific Research Physical-Chemical Institute imeni L. Ya. Karpov; Institute of Precision Chemical Technology imeni M. V. Lomonosov, Moscow

[Abstract] In studying the title salts, special interest is devoted to the dependence of electrical properties on polycation structure. Those obtained by the Menshutkin reaction from tertiary aliphatic diamines and aliphatic dihalogenides permit changing polycation structures in wide limits. The authors studied the synthesis, composition and properties of the title salts of 6,6-ionene and other symmetrical aliphatic ionenes (4,4-, 5,5- and 5-0,5-0-ionenes). The data indicate that polymer ion-radical salts obtained by a one-stage method have relatively low resistance (with the exception of 6,6-ionene), and oxygen-containing ionene salts are particularly good conductors. A two-stage process with lithium salt produced a simple ion-radical salt to which the necessary quantity of the title methane was then added, permitting production of complex ion-radical salts of a desired composition. The abnormally-high resistance of 6,6-ionene salts is attributed to chemical and phase irregularities. Separation of the title compound into a crystalline phase was observed where the ratio of TCQM : $\mathrm{TCQM}^{\dot{-}}$ equalled 1.5. Figures 4; references 9: 6 Russian, 1 Japanese, 2 English.
[228-12131]

UDC 678.746 : 678.073

RHEOLOGICAL PROPERTIES OF POLYSTYRENE GAS-FILLED COMPOSITIONS

Ivanovo IZVESTIYA VYSSHIKH UCHEBNYKH ZAVEDENIY: KHIMIYA I KHIMICHESKAYA TEKHNOLOGIYA in Russian Vol 25, No 4, Apr 82 (manuscript received 6 Jun 80) pp 477-479

OKUNEV, P. A., PANOV, Yu. T. and MITROFANOV, A. D., Department of Plastic Processing Technology, Vladimir Polytechnical Institute

[Abstract] Little study has been made previously of rheological properties of polymer-gas fusion systems. The authors studied emulsified polystyrene with a melting index of 109 g/10 min at 200° C and 0.51 MPA pressure in the presence of azoisobutyronitrile as a gas source. Tests were done in hermetically sealed chambers to prevent gas loss, where tablets of gas-polymer fusion were formed without heat before being subjected to heat for the tests. Results showed that 5% azoisobutyrobitrile reduced viscosity by a factor of ten. Analysis of the data led to the hypothesis that with gas content below 0.4% in a polymer, nearly all the gas introduced into the composition participates in expanding the free volume of the system. With higher gas content and increased temperature, markedly higher viscosity results. The equipment used did not permit tests at pressures above 18 MPA. The viscosity information obtained can be applied in choosing optimum recipes and processing for gas-filled polymers. Figures 4; references 2 (Russian). [244-12131]

UDC 541.15

RADIOCHEMICAL RESEARCH

Moscow IZVESTIYA AKADEMII NAUK SSSR: SERIYA KHIMICHESKAYA in Russian No 4, Apr 82 (manuscript received 1 Dec 81) pp 731-750

SPITSYN, V. I., Institute of Physical Chemistry, USSR Academy of Sciences, Moscow

[Abstract] The author reviews the work of the Laboratory for Radiochemical Studies, which he has directed since its establishment in 1954 by the USSR Academy of Sciences Institute of Physical Chemistry. The laboratory has studied technetium, prometium, many actinides, and uranium fission products, among other projects. Quantum chemistry has been employed in predicting extreme valency of actinides. Practical applications of radioactive elements form another direction of the laboratory's efforts. The review covers general physical and physico-chemical properties of radioactive substances, including actinides and trans-uranium elements such as neptunium, plutonium and americium. Study of actinide properties by electrochemical and other methods focussed on problems such as the internal 6p-atomic orbitals involved in chemical bonds, and the stability of high oxidation levels in these compounds. Discovering a heptavalent state in trans-uranium elements, followed by discovery of C_m(VI), confirmed the need to revise the actinide theory where it states that higher valent forms are merely deviations from actinide behavior norms. Studies of the chemistry of technetium, prometium and protactinium include using the first as an alloy for stainless steel and determining its high anticorrosion durability with 2 years of testing in the Barents Sea. Other topics reviewed include methods for isolating and purifying radioactive fission and trans-plutonium elements, and applications for radioactive indicators in studying structures and properties of certain heteropoly compounds. Figures 9; references 107: 93 Russian, 14 Western.
[216-12131]

UDC 542.91 : 541.6 : 541.49 : 546.791

SYNTHESIS, STRUCTURE AND THERMOLYSIS OF URANYL ACETATE COMPOUNDS WITH CERTAIN AMIDES

Moscow IZVESTIYA AKADEMII NAUK SSSR: SERIYA KHIMICHESKAYA in Russian No 4, Apr 82 (manuscript received 16 Nov 81) pp 812-818

SPITSYN, V. I., KOLESNIK, V. V., MISTRYUKOV, V. E., YURANOV, I. A., MIKHAYLOV, Yu. N. and DUNAYEVA, K. M., Moscow State University imeni M. V. Lomonosov; Institute of General and Inorganic Chemistry imeni N. S. Kurnakov, USSR Academy of Sciences, Moscow

[Abstract] Addition of a neutral ligand such as ammonia, aliphatic amines and amides into the uranium atom has been found by various studies to reduce thermal stability and affect thermal decomposition of carboxylates. The composition of related oxides during decomposition in a vacuum differ from stoichiometric UO_2 in relation to the content of mobile H atoms at the nitrogen in coordinated ligands. The authors describe changes in the structure of an initial uranyl carboxylate $UO_2(CH_3COO)_2 \cdot H_2O$ after introduction of nitrogen-containing neutral ligands in the uranyl coordination sphere, and the effect of the coordination and composition of the ligand on the course of thermal decomposition of the complex. The two compounds obtained, bisdiacetatodimethylacetamide uranyl and triacetatodioxy(VI) uranate, have the advantage of being soluble in polar solvents such as water and alcohol. Thermolysis of the complexes was studied in poly-, quasi- and isothermal conditions. Infrared spectra indicate that a fundamental restructuring occurs in the initial uranyl acetate as the coordinated water molecules are replaced by nitrogen-containing ligands; this is accompanied by a change in carboxyl groups from bridge to island forms. The dimer fragments lack concise contacts, and their reaction is purely of the Van der Waals type. Increased temperature contributes to these processes. X-ray structures are $[UO_2(CH_3COO)_2 \cdot DMAA]_2$ and $[UO_2(CH_3COO) \cdot Ur_3](UO_2(CH_3COO)_3]$. Figures 3; references 7: 6 Russian, 1 Western.
[216-12131]

UDC 542.941 : 546.799.4

REDUCING PLUTONIUM TO BIVALENT STATE

Moscow IZVESTIYA AKADEMII NAUK SSSR: SERIYA KHIMICHESKAYA in Russian No 4, Apr 82 (manuscript received 19 Nov 81) pp 818-820

MIKHEYEV, P. B., AUERMAN, L. N., RUMER, I. A., D'YACHKOVA, R. A. and SPITSYN, V. I., Institute of Physical Chemistry, USSR Academy of Sciences, Moscow

[Abstract] Compounds with low oxidation levels are commonly obtained by halogenoid solution reactions with metal. Plutonium with less than 3+ oxidation has not, however, been obtained in this way. Lowering the oxidizing

potential of a system for reducing Am(III) to Am(II) is impossible for large amounts of Pu(III). The authors used a system of dissolved salts containing PSE halogenides to form cocrystals with lanthanoids and actinoids in a trivalent state. Experiments determined that in the 2+ oxidation state these elements did not have an oxychloride phase. Experimental data were processed by sum of least squares method. Results showed that plutonium(III) was reduced by praseodymium(II) to Pu(II), with a standard oxidation potential of -2.59 B. The authors' findings differ from those of Nugent et al. (Journal of Physical Chemistry, 1973). References 5: 1 Russian, 4 Western.
[216-12131]

UDC 541.124 : 542.943 : 546.799

METHODS OF STABILIZING TRANS-URANIUM ELEMENTS AT UNSTABLE OXIDATION LEVELS

Moscow IZVESTIYA AKADEMII NAUK SSSR: SERIYA KHIMICHESKAYA in Russian No 4, Apr 82 (manuscript received 1 Dec 81) pp 821-826

SPITSYN, V. I. and KROT, N. N., Institute of Physical Chemistry, USSR Academy of Sciences, Moscow

[Abstract] The authors review stabilization methods and prospects for their use, including atmospheric oxygen oxidation of ions that have strong reducing properties; oxidation-reduction reactions of ions with solvents, particularly with water; self-oxidation and reduction, or ion disproportions in trans-uranium elements; ion oxidation or reduction by impurities in solvents; and oxidation-reduction reactions triggered by radiolytic and photochemical effects. Some of these processes, such as atmospheric oxygen oxidation and oxidation or reduction by impurities, can be eliminated by corresponding purification techniques, and others are of little importance. With elements having atomic numbers above 97, however, radiolytic effects must be considered. Reactions with ions having strong oxidizing or reducing properties are most difficult to prevent, and directions to accomplish this include selective bonding or unstable ions, temperature reduction, and stabilization in the solid phase. New complexes can be formed only to stabilize tetra-, hexa- and heptavalent actinides. OH^- ions have been effective in stabilizing high levels of oxidation, and high concentrations of F^- or H_3PO_4 have stabilized trans-uranium elements with unstable, +4 oxidation states. Americium(VII) has been obtained by ozonization of cooled Am(VI) solutions in 3-4 M NaOH. References 26: 16 Russian, 10 Western.
[216-12131]

UDC 542.65:546.79

ACTINOID COPRECIPITATION WITH TRIVALENT IRON ALKYLPHOSPHONATES

Leningrad RADIOKHIMIYA in Russian Vol 24, No 2, Mar-Apr 82 (manuscript received 27 Mar 81) pp 241-243

FEDOSEYEV, D. A., KERMANOV, V. P., KULIKOV, I. A. and FILIN, V. M.

[Abstract] The authors studied extraction of plutonium (IV,VI) in ion and colloidal forms and neptunium (V,IV) by coprecipitation from nitrogen oxide solutions with isooctylphenyl (I)-isooctylethyloxymethylene (II)-, isooctylbutyloxymethylene (III)-, diisooctyloxymethylene (IV)- and isooctylphenyloxymethylene (V)-phosphonates of trivalent iron. Actinoid solutions, in ion forms, were prepared by an electrochemical method; valence control was by spectrophotometry. Data showed that the relative content of plutonium (IV) resulting from coprecipitation with all tested alkylphosphonates was 2-3%, indicating 98% ionic plutonium extraction. About 90% colloidal plutonium (IV) and plutonium (V) were extracted, while neptunium (V) remained almost completely in the solution and neptunium (IV) quantitatively entered the iron (III) alkylphosphonate. The ion exchange mechanism of the reaction played an important role in extraction; that role decreased with increasing acidity. With about 0.1 mol/lit. acidity, neptunium (V) extraction was 50-70%; it then passed through a minimum at 1.5 mol/lit. of HNO_3, and then increased again to 20-30%. The linear character of plutonium (IV) and neptunium (IV) content in iron isooctylphenylphosponate precipitate in relation to actinoids in the initial solution suggests the isomorphic nature of coprecipitation of actinoid ion forms. Figures 2; references 5 (Russian).
[224-12131]

UDC 539.172.12 : 546.41 : 546.46

RADIOCHEMICAL PURIFICATION OF MAGNESIUM AND CALCIUM OXIDES ENRICHED WITH STABLE ISOTOPES AND IRRADIATED WITH PROTONS AT 1 GIGALECTRON VOLT ENERGY

Leningrad RADIOKHIMIYA in Russian Vol 24, No 2, Mar-Apr 82 (manuscript received 25 Feb 81) pp 252-255

ALEKSEYEV, Ye. G., GUSEL'NIKOV, V. S., ZAYTSEV, V. M., KONEVA, T. V. and SEROVA, V. A.

[Abstract] High energy proton irradiation of magnesium and calcium forms long-life radioactive nuclides, beryllium-7 and sodium-22, with half-life respectively of 53.3 days and 2.6 years. This and the high cost of target materials make effective purification essential. The authors first measured ^{22}Na formations from magnesium-24, -25, and -26 and sodium-40 and -44 at 1 Gev energy, then irradiated pressed magnesium oxide and calcium carbonate tablets of 1mm X 10mm diameter. Gamma-spectrometry using Ge(Li)-detectors yielded

data indicating that ^{22}Na formation cross-sections from magnesium and calcium were highly dependent on the number of neutrons in nuclei with the same number of protons, with a sharp drop in cross-section when the number of neutrons in the initial nucleus increased. The purification method resulted in a calculated gross yield of magnesium of 97-98%, with a coefficient of purification of ^{7}Be and ^{22}Na of $5 \cdot 10^2$. Calcium yield was 98-99%, with purification coefficient of ^{7}Be at $5 \cdot 10^2$ and of ^{22}Na at 10^2. References 8: 5 Russian, 3 English.
[224-12131]

UDC 541.183 : 546.791

SORPTION OF URANIUM FROM SEA WATER BY MIXED INORGANIC SORBENTS

Leningrad RADIOKHIMIYA in Russian Vol 24, No 2, Mar-Apr 82 (manuscript received 10 Jun 81) pp 258-259

AFANAS'YEV, Yu. A., AZHIPA, L. T., RYABININ, A. I., SAVENOK, N. B. and YEREMIN, V. P.

[Abstract] Titanium (IV) oxide hydrate is recognized as one of the most effective sorbents of uranium (VI). The authors studied extraction of microquantities of uranium from Black Sea water by mixed inorganic sorbents based on cerium (IV) oxide hydrate, titanium (IV) phosphates, lead (IV), and silica gel as inert carrier. These substances dissolve with difficulty. After preparing the sorbents, the sea water, containing an average 2.55 mcg/lit. of uranium, was filtered through a column containing the separate sorbents. The data collected indicated that cerium (IV) oxide hydrate was the most effective sorbent, gathering uranium from the sea water at a rate of 1 kg per 4800 liters. The tested sorbents generally were more effective than the previously studied titanogel. Of several elutriators tested, the best was sodium chloride in a 5-6 mol/lit. solution. References 7: 5 Russian, 2 English.
[224-12131]

UDC 66.067 : 546.79 : 546.72

OBTAINING IRON-55 PREPARATIONS OF HIGH RADIOCHEMICAL PURITY

Leningrad RADIOKHIMIYA in Russian Vol 24, No 2, Mar-Apr 82 (manuscript received 27 Jul 81) pp 262-263

YEGOROV, A. I., MOROZOV, B. A., IVANCHENKO, A. F., KARAZHANOVA, G. I. and SAFONOV, A. V.

[Abstract] The authors tested an effective method for purifying iron-54,55 of radioactive manganese-54 by extraction using methylisobutyl ketone (hexone). Extraction was chosen over electrochemical and chromatographic methods for its speed and relative freedom from radiation effects, and the possibility of distant performance of the most dangerous operations. The authors' method used hydrochloric acid solutions in hexone without salting-out agents. Metal foil of irradiated monisotope iron-54 was placed in a glass with $MnCl_2$ and HCl, then heated until the iron dissolved. Eventually an $FeCl_3$ precipitate underwent further stages, and the iron was reextracted by adding double-distilled water to the extractor containing hexone. A coefficient of iron purification of manganese of $8 \cdot 10^4$ to $1 \cdot 10^5$ was calculated, with no more than 0.2% iron loss. References 4 (Russian).
[224-12131]

UDC 621.315.592.3

RADIATION DEFECTS IN SURFACE LAYER OF OXIDIZED SILICON IMPLANTED BY IONS OF VARIOUS CHEMICAL IMPURITIES

Moscow POVERKHNOST': FIZIKA, KHIMIYA, MEKHANIKA in Russian No 5, May 82 (manuscript received 10 Jul 81) pp 81-88

LYSENKO, V. S. and NAZAROV, A. N., Institute of Semiconductors, UkSSR Academy of Sciences, Kiev

[Abstract] Little data is available on formation and energy spectra of defects in thin surface semiconductor coatings in metal-dielectric-semiconductor systems. The authors studied such parameters after implanting an oxidized layer of $Si\text{-}SiO_2$ with $^{16}O^+$, $^{31}P^+$, $^{40}Ar^+$, and $^{75}As^+$ at 1150° C with 100 Kev, and $^{11}B^+$ at 60 Kev. A volt-farad method was used for studying the nature of radiation defects at room temperature, and a thermal-stimulation charge release method was used in a range of 80-300 K. The B^+, O^+, P^+ and Ar^+ ions brought fundamental changes in volt-farad characteristics. The thermal-stimulation charge release spectra of silicon dioxide bombarded with B^+, O^+, P^+ and Ar^+ showed current peaks at 102 K, 115 K, 145 K and 166 K, while As^+ showed a single powerful peak at 181 K, with n-type silicon; with p-type, corresponding peaks were at 100 K, 120 K, 140 K, 155 K, 180 K and 210 K, while As^+ again had a single peak, at 195 K. Volt-farad results indicated independent formation of defects, regardless of the impurity, with the degree of alloying being affected by the exact impurity introduced. The defects were at the dielectric-semiconductor boundary and in the latter's surface area. Figures 5; references 41: 12 Russian, 29 Western.

UDC 541.15

RADIOLYSIS OF CYCLOHEXANE-ISOOCTANE MIXTURES

Moscow KHIMIYA VYSOKIKH ENERGIY in Russian Vol 16, No 3, May-Jun 82 (manuscript initially received 22 Oct 79; after revision, 22 Sep 81) pp 221-224

PICHUZHKIN, V. I., CHEKH, R., ZIMINA, G. M. and SARAYEVA, V. V., Moscow State University imeni M. V. Lomonosov; Institute of Electrochemistry, USSR Academy of Sciences

[Abstract] The authors used the title radiolysis to study the mechanism of energy transmission relative to mixture composition and radiation temperature for a quantitative evaluation of charge transmission processes and excitation. Perfluorohexane was added to chromatographically pure solutions of the title hydrocarbons. Then they were subjected to a vacuum and irradiated with ^{60}C gamma rays at 27 and 78° C. Individual hydrocarbons were processed by impulse radiolysis and analyzed with a chromatograph using a flame-ionization detector. Results showed that increasing the temperature brought higher yields of isobutane and isobutylene, while adding perfluorohexane reduced yields of both. Products of isooctyl radical dimerization were not found. Two energy transmission mechanisms were discovered: excitation transmission and charge transmission. The results of other related reactions are also summarized. Figures 2; references 11: 5 Russian, 6 Western.
[241-12131]

UDC 541.15

RADIOLYSIS OF ADSORBED WATER MOLECULES ON Al_2O_3, La_2O_3, Er_2O_3 and BeO OXIDES

Moscow KHIMIYA VYSOKIKH ENERGIY in Russian Vol 16, No 3, May-Jun 82 (manuscript received 24 Dec 80) pp 225-227

GARIBOV, A. A., MELIKZADE, M. M., BAKIROV, M. Ya. and RAMAZANOVA, M. Kh., Radiation Research Sector, AzSSR Academy of Sciences

[Abstract] The authors studied the title oxides by first conditioning them at 500° C for 12 hours, and then processing them in a vacuum for 5 hours at 350° C. Double-distilled water was used for the adsorption tests. Ampules containing the oxides were irradiated with gamma-radiation from ^{60}Co. Analysis of radiolysis products showed H_2 and O_2 content in proportions above stoichiometric norms, indicating oxygen entrapment in the oxide structures. Hydrogen yield corresponded to the quantity of water molecules subjected to radiolysis. The oxides had a catalytic effect on the radiation chemical decomposition of the water, and were able to transmit absorbed energy from ionizing radiation to molecules adsorbed on their surfaces. BeO had relatively high catalytic activity, apparently due to a recombination mechanism of the decomposition of adsorbed molecules. Figure 1; references 10 (Russian).
[241-12131]

UDC 541 (14+15+64)

MAGNETIC EFFECT ON FREE RADICAL FORMATION STAGE IN PHOTOLYSIS AND RADIOLYSIS OF POLYMERS

Moscow KHIMIYA VYSOKIKH ENERGIY in Russian Vol 16, No 3, May-Jun 82
(manuscript received 12 Feb 81) pp 246-248

ZHDANOV, G. S., Scientific Research Physicochemical Institute imeni
L. Ya. Karpov

[Abstract] To study effects of a constant magnetic field on processes in the condensed phase involving free radicals and excited molecules, the authors irradiated polymethylmethacrylate (PMMA), polycaproamide (PA), polyvinyl alcohol (PVA) polypropylene (PP) and polydimethylsiloxane (PDMS) and ^{60}Co; gamma-rays at 77 and 273 K in an electromagnetic field, at currents from 280 to 955 kiloamperes/min. Electron spin resonance spectra were taken to determine results. Results showed that irradiation in a magnetic field brought greater increased concentrations of free radicals than did radiolysis in the earth's magnetic field alone. Paired comparison of samples from the magnetic field assisted in reducing measurement errors and in calculating the results of various series of experiments. Magnetic field effects involved particles wherein transitions between various levels of spin multiplicity were possible. PMMA radiolysis takes place as free ions form in the decomposition of excited molecules during charge recombination, and the single or triplet state of the excited molecules determines the likelihood for radical formation. Magnetic effects on other polymers were less pronounced. References 6 (Russian).
[241-12131]

RUBBER AND ELASTOMERS

UDC 541(64+127+24)

KINETICS OF MOLECULAR CHARACTERISTIC CHANGE OF SKI-3 ISOPRENE RUBBER DURING ROLLER PROCESSING

Moscow VYSOKOMOLEKULYARNYYE SOYEDINENIYA in Russian Vol 24, No 4, Apr 82 (manuscript received 20 Dec 80) pp 843-848

VOL'FSON, S. I., KARP, M. G. and KIRPICHNIKOV, P. A., Kazan' Chemical and Technological Institute imeni S. M. Kirov

[Abstract] Contradictory tendencies in SKI-3 rubber call for limiting low-molecular fractions to improve physicomechanical properties on the one hand, while on the other, such fractions promote macromolecular flexibility and enhance durability. Rheological and viscosity tests and gel penetration chromatography were used by the authors to study qualitative and quantitative molecular parameters of various industrial SKI-3 rubbers during mechanical destruction. They sought to determine whether branched structures appeared or only linear macromolecules of lower molecular mass. Results showed more rapid plastification with higher initial molecular mass. An equation, $M_t=M_\infty+ C_1e^{-k\ t} +C_2e^{-h2t}$, was derived which describes the kinetics of mechanical destruction of SKI-3. Theoretical and experimental data agree. Physicomechanical properties of vulcanized rubber improved as molecular mass differences narrowed and molecular mass increased. Figures 5; references 15: 10 Russian, 5 Western.

[228-12131]

UDC [628.543.5+628.543.15] : 546.221

PURIFYING SULFUR-ALKALINE WASTES OF PHENOLS BY SULFONE EXTRACTION

Moscow KHIMIYA I TEKHNOLOGIYA TOPLIV I MASEL in Russian No 5, May 82 pp 36-39

KOCHETKOVA, R. P., EPPEL', S. A., NIKITISHINA, V. A., BONDARENKO, M. F., VYKHOVANETS, V. V., KOLISNYK, G. P. and KOZIN, V. G., "INUS" [expansion unknown]; "Angarsknefteorgsintez" Production Association; Scientific Research Institute for Petroleum Chemistry; Kazan' Chemical and Technological Institute imeni S. M. Kirov

[Abstract] Phenol removal by carbonization or extraction by organic solvents such as butylacetate either destroy the phenols or cause intensive saponification. The authors sought chemically and thermally-stable extracting agents that would enable recovery of phenols and alkali for reuse in oil purifying processes. Since the phenols were volatile homologs, extractants with high boiling points R_2SO_2 petroleum sulfones, were used. These dissolved well in various organic solvents but poorly in water. The authors studied the thermodynamic balance of water-phenol (such as o-, m-, p-cresols, pyrocatechol and resorcin)-sulfones. No dimerization was noted of the indicated phenols in aqueous or organic phases. Increased temperatures (from 20 to 80° C) reduced the distribution coefficient of the phenols. The pH factor in a range of 2-8 had little effect on phenol extraction. With a ratio of extractant: water of 1 : 10, as high as 96% extraction was achieved, yielding commercial phenols and cutting alkali consumption for recovering light petroleum products while reducing the load on biochemical purification facilities. Figures 5; references 9 (Russian).
[240-12131]

SCIENTISTS DESIGN BACTERIA TRAP

Moscow SOTSIALISTICHESKAYA INDUSTRIYA in Russian 8 Jun 82 p 2

[Article by D. Patyko: "A Sieve for Bacteria"]

[Text] Ladling water with a screen is not as useless as it may seem. Belorussian scientists who have developed an extremely fine polymer "sieve" are doing exactly this to sterilize water. Their microfilter allows water molecules to freely pass but detains "cumbersome" bacteria. This maximally simplifies decontamination of liquids: They need not be boiled, and they need not be processed with radioactive isotopes.

To manufacture their bacteria trap, scientists of the Institute of Physical and Organic Chemistry, Belorussian SSR Academy of Sciences selected chemical compounds which force molecules, of capron for example, to form an unusual cross-linked structure of a strictly determined size. This produces a thin, elastic and very strong film outwardly recalling paper.

11004
CSO: 1841/261

UDC 541.138.2

REDUCING ORGANIC COMPOUNDS USING ORGANIC METAL ELECTRODE -- ALLOYED POLYPYRROLE

Moscow IZVESTIYA AKADEMII NAUK SSSR: SERIYA KHIMICHESKAYA in Russian No 4, Apr 82 (manuscript received 17 Sep 81) p 953

AFANAS'YEV, V. A., MAKAROV, A. F. and KHIDEKEL', M. L., Institute of Chemical Physics, USSR Academy of Sciences, Chernogolovka Division

[Abstract] Polypyrrole alloyed with BF_4^- with properties of an organic metal is shown to be useful as an electrode for reducing organic compounds such as chlorobenzene, which reduces in DMFA to benzene, and nitrobenzene, which selectively reduces to p-aminophenol. The anode can be platinum, graphite or a silicarbon. and the substrate does not affect the products of the reduction. Reference 1 (English).
[216-12131]

UDC 541.49:547.1'118:546.92

REACTION OF $Cp(CO)_2Mn=C=CHPh$ WITH TRIETHYLPHOSPHITE PLATINUM COMPLEX

Moscow IZVESTIYA AKADEMII NAUK SSSR: SERIYA KHIMICHESKAYA in Russian No 4, Apr 82 (manuscript received 12 Nov 81) pp 953-954

ANTONOVA, A. B., GUBIN, S. P. and KOVALENKO, S. V., Institute of Chemistry and Chemical Technology, Siberian Division, USSR Academy of Sciences, Krasnoyarsk

[Abstract] Earlier it was reported that a MN=C-C system was capable of coordinating electronically unsaturated metal-carbonyl fragments to form binuclear compounds. The authors produced two new products through the reaction of $CpMn(CO)_2(C=CHPh)$ with $Pt[P(OEt)_3]_4$: a binuclear heterometallic complex with μ^2-ligands C=CHPh and CO, and a manganese complex with η^2 ligand by a diethyl ester of beta-phenylvinylphosphonic acid. The latter appears to be an unusual variant of the Arbuzov reaction. References 3: 1 Russian, 2 Western.
[216-12131]

CSO: 1841 END

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USSR Report

CHEMISTRY

No. 91

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UDC 541.183.3

KINETICS OF FORMATION OF ADSORPTION LAYERS OF LONG-CHAIN SURFACE-ACTIVE IONS ON EASILY MOBILE PHASE DIVISION BOUNDARIES: ADSORPTION OF CETYLTRIMETHYLAMMONIUM FROM AQUEOUS SOLUTIONS AT BOUNDARY WITH AIR AND WITH OCTANE

Moscow VESTNIK MOSKOVSKOGO UNIVERSITETA, SERIYA 2: KHIMIYA in Russian
Vol 23, No 3, May-Jun 82 (manuscript received 25 Aug 81) pp 243-249

ZADYMOVA, N. M., TSIKURINA, N. N. and MARKINA, Z. N., Department of Colloid Chemistry

[Abstract] The study of the kinetics of formation of ionized adsorption layers of surfactants generates information on their structure, which is little studied due to the lack of direct methods of investigation. The studies indicated that the activation energy of adsorption was virtually 0. The ion desorption rate coefficients increase slightly with temperature. The standard thermodynamic functions of adsorption and desorption of CTA ions to and from monolayers at the division boundaries were calculated. Analysis of the kinetic data produced indicates that adsorption layers of CTAB (bromide) include areas with varying degrees of interaction among the long-chain ions. The loss of entropy in the process of activation of adsorption of CTA ions is practically identical for low and moderate degrees of water-air division boundary surface filling. The kinetic model of adsorption of long-chain ions is used to analyze the mechanism of introduction of ions of a typical cation-active stabilizer (CTAB) into the adsorption layer and the departure of them from it into the aqueous phase, as well as certain specifics of the structure of ionized adsorption layers of this surfactant. There is found to be a significant entropy activation barrier in the adsorption of long-chain diphilic ions from aqueous solutions; this barrier is related to the need to orient them, there is, also, an activation barrier, entropic in character, for desorption, due to loss of conformation entropy of the hydrocarbon radicals desorbing the surfactant ions and due to the specific structure of the solvent. Figures 3; references 8: 6 Russian, 2 Western. [281-6508]

ALKALOIDS

UDC 547.944/945

STRUCTURE OF SIBIRIN

Tashkent KHIMIYA PRIRODNYKH SOYEDINENIY in Russian No 2, Mar-Apr 82 (manuscript received 28 May 81) pp 225-227

OSMANOV, Z., IBRAGIMOV, A. A. and YUNUSOV, S. Yu., Order of the Red Banner of Labor Institute of Plant Substance Chemistry, UzSSR Academy of Sciences, Tashkent

[Abstract] Continuing their study of the surface parts of Nitraria sibirica Pall gathered near the settlement Rybach'ye in Kirghizia in May, 1976, the authors isolated a new optically-active liquid base $C_{11}H_{21}NO$, which they named sibirin, and a number of derivatives. Features of infrared spectra are discussed. Since the PMR spectrum contained N-methyl proton signals, the authors suggest that sibirin is an N-methyl derivative of nitramine or isonitramine. Further examinations and comparisons indicated that it is an antipode of N-methylisonitramine with the structure 2-methyl-2-azaspiro[5,5] undecane-7-91. Chemical procedures are given in the experimental section. References 2 (Russian).
[271-12131]

UDC 546.944/945

BAYKALIN, A NEW APORPHINE ALKALOID FROM THALICTRUM BAICALENSE

Tashkent KHIMIYA PRIRODNYKH SOYEDINENIY in Russian No 2, Mar-Apr 82 (manuscript received 26 Jun 81) pp 227-230

MAYEKH, S. Kh., YUNUSOV, S. Yu., BORKO, E. V. and STARCHENKO, V. M., Order of the Red Banner of Labor Institute of Plant Substance Chemistry, UzSSR Academy of Sciences, Tashkent; and Pacific Ocean Institute of Bioorganic Chemistry, Far Eastern Scientific Center, USSR Academy of Sciences, Vladivostok

[Abstract] Continuing their study of Far Eastern Thalictrum, the authors examined the peculiar East Asian Th. baicalense Turcz, included among Physocarpum DC. in the publication FLORA USSR but distinguished from other

meadow rues by its swollen egg-shaped or round woody fruits. It is found in southeastern Siberia, the Amur river basin and Korea; the specimens examined came from the Khabarovsk region. Infrared, mass and NMR spectra showed that the crystalline, optically-active base here named baykalin is a new, penta-substituted noraporphine base from which N-methyl- and N-acetylbaykalin were derived. Its structure is 2,3-methylenedioxy-1,9,10-trimethoxynoraporphine. Chemical procedures are given in the experimental section. References 7: 2 Russian, 5 Western.
[271-12131]

UDC 615.322:547.92 (Crinum)

ALKALOID COMPOSITION OF CRINUM AMABILE BULBS

Tashkent KHIMIYA PRIRODNYKH SOYEDINENIY in Russian No 2, Mar-Apr 82 (manuscript received 15 Sep 81) pp 263-264

MURAV'YEVA, D. A. and POPOVA, O. I., Pyatigorsk Pharmaceutical Institute

[Abstract] Of more than 130 alkaloids in plants of the family Amaryllidaceae, the most valuable pharmacological forms are lycorine and galantamine. The authors studied surface and underground parts of Crinum amabile Donn. to determine alkaloid content. They found 0.78 and 0.74% total alkaloids in the leaves and roots, respectively, and 1.56% in the bulbs after first frost. These were lycorine, hippeastrine, crynidine, galantine, galamantine, narvedine and tazettine. References 5: 3 Russian, 2 Western.
[271-12131]

UDC 547.944/945

HYMENOCALLIS LITTORALIS ALKALOIDS

Tashkent KHIMIYA PRIRODNYKH SOYEDINENIY in Russian No 2, Mar-Apr 82 (manuscript received 16 Oct 81) pp 264-265

DABIRE, FREDERICK MUNVIME, and MURAV'YEVA, D. A., Pyatigorsk Pharmaceutical Institute

[Abstract] The perennial Hymenocallis littoralis Salisb. was studied from specimens gathered in Upper Volta and the Ivory Coast. All parts were examined by thin layer chromatography on KSK silica gel. The authors identified lycorine, tazettine and previously unidentified substances named trisferidine, hippeastrin (trisferine), pancratine (hemanthidine) and galantamine. References 9: 2 Russian, 7 Western.
[271-12131]

UDC 547.944/94

ALKALOIDS OF ACONITUM SAPOSHNIKOVII AND A. KARACOLICUM

Tashkent KHIMIYA PRIRODNYKH SOYEDINENIY in Russian No 2, Mar-Apr 82
(manuscript received 27 Nov 81) pp 265-266

SULTANKHODZHAYEV, M. N., YUNUSOV, M. S. and YUNUSOV, S. Yu., Order of the Red Banner of Labor Institute of Plant Substance Chemistry, UzSSR Academy of Sciences, Tashkent

[Abstract] The authors studied shoots of aconitum saposhnikovii B. Fedtsch collected in the Dolon pass of Kirghizia. Chloroform extraction yielded 0.54% total alkaloids, from which talatisamine, isoboldine, 14-acetyltalatisamine and a base $C_{24}H_{37}NO_5$ were isolated. From surface parts of Aconitum karacolicum Rapaics gathered in the upper Tyup river basin, they identified aconitine, zongorine, isoboldine and napelline N-oxides, along with a new base $C_{24}H_{35}NO_5$. NMR and infrared spectra indicate the latter to be an N-oxide of 12-acetylnapelline. References 9: 7 Russian, 2 Western.
[271-12131]

UDC 615.277.3:547.94:582.937].074

METHOD FOR DETERMINING VINBLASTIN AND LEUROSIN IN SURFACE PARTS OF CATHARANTHUS ROSEUS

Moscow KHIMIKO-FARMATSEVTICHESKIY ZHURNAL in Russian Vol 16, No 6, Jun 82
(manuscript received 14 Apr 81) pp 708-715

SAPUNOVA, L. A., GAYEVSKIY, A. V., MASLOVA, G. A. and GRODNITSKAYA, Ye. I., All-Union Scientific Research Institute of Medicinal Plants, Moscow Oblast

[Abstract] Vinblastin and leurosin from Catharanthus roseus (L.) G. Donn, with antineoplastic and antileukotic effects, are being studied in many countries, but little has been written on determining their presence in the raw plant. The authors propose a method for simultaneous measurement of both substances using sephadex and unidirectional thin layer chromatography. The procedures include extraction and purification of total alkaloid content using benzene and/or toluene, separating the alkaloid mixture using a silica gel (from the West German Merck firm) and extraction-photometric determination of the alkaloids after chromatography. After grinding the analytical sample, one of two methods is used for extracting and purifying the target alkaloids, depending on the quality of the raw material. Other steps include preparing the calibration graph and sorbents, readying the column with sephadex and calibrating the column. References 8: 2 Russian.
[269-12131]

ANALYTICAL CHEMISTRY

UDC 542.61

EFFECT OF INTRODUCING SULFUR INTO MOLECULES OF NEUTRAL ORGANIC PHOSPHORUS EXTRACTANTS ON THEIR EXTRACTION CAPABILITY FOR URANIUM(VI) AND CERIUM(III)

Leningrad ZHURNAL OBSHCHEY KHIMII in Russian Vol 52, No 6, Jun 82
(manuscript received 9 Nov 81) pp 1232-1235

ROZEN, A. M. and YURKIN, V. G.

[Abstract] Like oxygen, sulfur is an electron donor, although of weaker strength. The authors studied the prospects of using sulfur-containing extractants to obtain actinoid and rare earth elements, with a series of bifunctional compounds containing PO and SO groups. Results indicated that replacing one ester atom of oxygen with sulfur brought no noticeable change in the reaction capability of phosphates with $(C_4H_9O)_2POSC_4H_9$ as extractant. If sulfur was separated from phosphoryl groups by CH_2 groups, the negative induction effect weakened in direct correlation to the distance of the sulfur from the PO group; the extraction constant increased and extraction capability approached that of phosphonates. In thioester compounds, sulfur was a weak extraction center. Disulfoxides retained the properties known for diphosphine dioxides, but the transition to the former brought reduced extraction, in a manner analogous to that reduction in the transition from monodentate extractants containing phosphorus to monodentate sulfoxides. Replacing the PO group with SO groups in diphosphine dioxides sharply reduced extraction capability for nitric acid, uranium and cerium. Figures 2; references 4 (Russian).
[283-12131]

UDC 542.61

EFFECTS OF INTRODUCING SULFUR IN MOLECULES OF ACID ORGANOPHOSPHORUS EXTRACTANTS ON THEIR EXTRACTION CAPABILITY FOR URANIUM (VI) AND CERIUM (III)

Leningrad ZHURNAL OBSHCHEY KHIMII in Russian Vol 52, No 6, Jun 82
(manuscript received 29 Dec 81) pp 1235-1237

ROZEN, A. M. and YURKIN, V. G.

[Abstract] The title substitution was studied using di-2-ethylhexyl phosphoric acid. Oxygen was replaced by sulfur in both PO and OH groups using di-2-ethylhexyldithiophosphoric acid and its analog diphenyldithiophosphoric acid. The di-2-ethylhexyl- variant extracted nitric acid more weakly by an order of one than did the initial acid. There was a sharp decrease in reaction capability for uranium (VI) and cerium (III), although the cation exchange in the weak acid zone and solvate exchange in higher acidity continued. Gradual oxidation of di-2-ethylhexyldithiophosphoric acid took place even at low concentrations of nitric acid, and became faster as those concentrations grew, forming a product that had greater reaction capability for uranium (VI). Introducing highly electronegative substituents did not change effectiveness for cerium (III), but significantly reduced it for uranium (VI). Figures 1; references 4 (Russian).
[283-12131]

BIOCHEMISTRY

UDC 547.752

QUATERNARY PYRIDINIUM SALTS OF INDOL DERIVATIVES

Yerevan ARMYANSKIY KHIMICHESKIY ZHURNAL in Russian Vol 35, No 5, May 82 (manuscript received 26 Jan 81) pp 341-343

YESAYAN, Z. V., CHACHOYAN, A. A. and PAPAYAN, G. L., Institute of Precision Organic Chemistry imeni A. L. Mndzhoyan, Armenian Academy of Sciences, Yerevan

[Abstract] The oxoindolyl-3-acetic acid required for the synthesis of aminoethyl derivatives of triptamine with the oxoindol ring was obtained from indolyl-3-acetic acid by treating an ester of this acid with bromosuccinimide in the presence of pyridine, resulting in the formation of salts of pyridine in the second position of the indol ring. References 2: 1 Russian, 1 Western. [280-6508]

UDC 621.039.85:547.514.483

LABELED PROSTAGLANDINS (REVIEW)

Minsk VESTSI AKADEMII NAVUK BSSR: SERYYA KHIMICHNYKH NAVUK in Russian No 3, May-Jun 82 (manuscript received 26 Mar 81) pp 73-89

STRIZHAKOV, O. D., Institute of Bioorganic Chemistry, Belorussian Academy of Sciences

[Abstract] Studies of the synthesis and practical utilization of prostaglandins and their analogs have developed rapidly in recent years. This review discusses extensive studies on the mechanism of action of prostaglandins and their genetic relationship with other bioregulators. Chemical methods of production of labeled prostaglandins are briefly discussed and a table of labeled prostaglandins, their derivatives and their metabolites is presented. Methods include introduction of labels to natural prostaglandins, synthesis of prostaglandins from labeled precursors and by chemical modification of prostaglandins. Biochemical methods of production of labeled prostaglandins from labeled precursors are widely used. Labeled prostaglandins are used to study the biological activity of the substances to determine their mechanism of action.

The method of labeled prostaglandins has been found quite useful in medical practice, involving determination of prostaglandins in pathological changes and for diagnostic purposes. References 126: 12 Russian, 114 Western.
[282-6508]

UDC 54.866+660

PROSPECTS FOR USING BIOCATALYSIS IN CHEMICAL TECHNOLOGY

Moscow ZHURNAL VSESOYUZNOGO KHIMICHESKOGO OBSHCHESTVA IM. D. I. MENDELEYEVA in Russian Vol 27, No 3, May-Jun 82 pp 302-308

BEREZIN, I. V., corresponding member, USSR Academy of Sciences; director, Institute of Biochemistry imeni A. N. Bakh, USSR Academy of Sciences; chief, Department of Chemical Enzymology, Moscow State University imeni M. V. Lomonosov

[Abstract] Enzymes have long been of theoretical interest for their high degree of specificity and high catalytic activity. Practical uses, however, have been limited due to high costs, homogeneity as catalysts, and their stability as technical enzymes. The author reviews enzyme synthesis of complex organic substances from simple compounds, yielding such products as 3,4-diohydroxyphenylalanine for treating Parkinson's disease, and synthesis of L-amino acids using amidase and racemase. Antibiotic production also utilizes various enzymes to obtain, for example, 6-aminopenicillinic acid. Enzymatic and microbiological treatment of biopolymers has led to production of edible sugars, such as glucose-fructose syrup, from waste products of the paper, lumber and food-producing industries. Enzymes are also being used as detectors, as the biochemical heat element in bioelectrocatalysis, and in energy conversion and assimilation for purifying waste and regeneration. References 51: 28 Russian, 23 Western.
[279-12131]

UDC 541.124/128.3+542.942.2+547.534+546.47:549.67

INFLUENCE OF COMPACTION PRODUCTS OF VARIOUS TYPES ON DEVELOPMENT OF ZINC-ZEOLITE CATALYST FOR PROCESS OF POLYMOLECULAR DEHYDROGENATION OF ETHYLBENZENE

Moscow VESTNIK MOSKOVSKOGO UNIVERSITETA, SERIYA 2: KHIMIYA in Russian
Vol 23, No 3, May-Jun 82 (manuscript received 6 Jul 81) pp 272-277

NGO TKHI TKHUAN, RUDENKO, A. P. and TOPCHIYEVA, K. V., Departments of Petrochemistry and Organic Catalysis and of Physical Chemistry

[Abstract] Experiments were performed with ethylbenzene on a 0.75 ZnY catalyst preliminarily treated with various quantities of styrene, cyclohexene, toluene, benzene, 1-hexene and pyridine to determine the role of compaction products produced from ethylbenzene and the influence of foreign compaction products on the process of development of zinc-zeolite catalysts. Deposition of compaction products from other substances onto the surface of the catalyst was found to facilitate development, with styrene having the greatest accelerating effect. Benzene, which produces little or no compaction products under the experimental conditions, had no effect. The studies of transformation of styrene under these conditions confirmed that it acts as an intermediate monomer in the polycondensation of ethylbenzene to compaction products. Figures 4; references 5: 5 Russian, 1 Western.
[281-6508]

UDC 541.128

PROMOTION OF NICKEL-COPPER PHOSPHIDE CATALYSTS

Minsk VESTSI AKADEMII NAVUK BSSR: SERYYA KHIMICHNYKH NAVUK in Russian
No 3, May-Jun 82 (manuscript received 29 Dec 81) pp 27-30

YERMOLENKO, Ye. N., SIDEL'TSEVA, M. A., YEROFEYEV, B. V. and GERASIMOVA, L. V., Institute of Physical and Organic Chemistry, Belorussian Academy of Sciences

[Abstract] A study is made of the possibility of increasing the activity and selectivity of nickel-copper phosphide catalysts by promoting them with sodium hydroxide. Analysis of X-ray diagrams of the initial specimens showed that

before heating they were radiologically amorphous. After heating in an atmosphere of nitrogen at 260°C, in addition to the well expressed copper reflexes, the diffraction diagrams also show peaks corresponding to nickel phosphides. Therefore both nickel phosphides with an overall formula of $Ni_{12}P_5$ and a solid solution of phosphorus and copper in nickel are present after heating in nitrogen. Studies of catalytic activity show that the conversion of cyclohexanol can reach 99.0% in the presence of the Ni-Cu-P catalyst. However, n unpromoted catalyst the dehydrogenation is accompanied by formation of significant quantities of benzene and products of its hydrogenation. Promotion with sodium hydroxide significantly increases the selectivity for cyclohexanone. Figure 1; references 7 (Russian).
[282-6508]

UDC 541.127+547.313.3

PROPYLENE POLYMERIZATION ON COMPLEX CATALYST CONTAINING delta-$TiCl_3 \cdot 0{,}3AlCl_3$ AND VARIOUS ALUMINUM ALKYLS

Alma-Ata IZVESTIYA AKADEMII NAUK KAZAKHSKOY SSR: SERIYA KHIMICHESKAYA
in Russian No 3, May-June 82 (manuscript received 11 Apr 80) pp 38-44

ZAVOROKHIN, N. D., FAVORSKAYA, M. V. and ZHUBANOV, B. A., Institute of Chemical Sciences, KaSSR Academy of Sciences, Alma-Ata

[Abstract] Propylene polymerization is characterized by sudden increases in rate followed by slowing when heterogeneous catalysts are used. The authors tested $AlEt_2Cl$, $AlEt_3$, $Al\underline{i}\text{-}Bu_2Cl$, $Al\underline{i}Bu_3$ and $Al\underline{i}\text{-}Bu_2H$ to determine their effects on activity and stereoregularity of the title catalyst. Results showed that the nature of the aluminum alkyl had a significant impact on the rate and nature of polymerization. $AlEt_2Cl$ and $Al\underline{i}\text{-}Bu_2Cl$ slowly formed active centers and "levelled" the rate of polymerization, while $AlEt_2$ or $Al(\underline{i}\text{-}Bu)_2H$ caused quicker activity. Not only the rate of polymerization but, also, the nature of its kinetic dependence and the stereoregulative ability of the active centers was tied to the precise aluminum alkyl used. The active centers were identified to be bimetallic complexes containing both titanium and aluminum. In the formation of the catalyst delta-$TiCl_3 \cdot 0{,}3AlCl_3\text{-}AlR_3(AlR_2H)$, two unstable types of active centers are formed that then are destroyed in accordance with monomolecular principles. Figures 3; references 20: 6 Russian, 14 Western.
[270-12131]

UDC 547.533+542.943+542.958

OXIDIZING AMMONOLYSIS OF p-TERT-BUTYLTOLUENE ON VANADIUM-TITANIUM CATALYST

Alma-Ata IZVESTIYA AKADEMII NAUK KAZAKHSKOY SSR: SERIYA KHIMICHESKAYA in Russian No 3, May-Jun 82 (manuscript received 8 Oct 79) pp 61-64

CHMYR', I. M., BUKEYKHANOV, N. R. and SUVOROV, B. V., Institute of Chemical Sciences, KaSSR Academy of Sciences, Alma-Ata

[Abstract] The p-Tert-butylbenzonitrile (TBBN) is used to prepare benzoguanine resins; it is also used in preparation of p-tert-butyl benzoic acid which can modify and stabilize polymers. Synthesis of TBBN by oxidative ammonolysis of p-tert-butyltoluene produces a yield of slightly more than 50%. When this synthesis is catalyzed with V_2O_5:TiO_2 in a ratio of 1:0.5, a yield of 83-87% TBBN is obtained. TBBN is converted to terephthalonitrile under harsher experimental conditions. Oxidizing ammonolysis of tert-butylbenzene and TBBN involves oxidizing dealkylation of the tert-butyl substituent and deep oxidation of resulting phenyl radicals. Chemical procedures are given in the experimental section. Figures 3; references 9: 6 Russian, 3 Western. [270-12131]

UDC 547.233.1.2

ADVANCES IN SYNTHESIS OF AMINO DERIVATIVES OF TERPENOIDS

Tashkent KHIMIYA PRIRODNYKH SOYEDINENIY in Russian No 2, Mar-Apr 82 (manuscript received 2 Sep 81) pp 145-159

KOZLOV, N. G., Institute of Physico-Organic Chemistry, BSSR Academy of Sciences, Minsk

[Abstract] Although little studied, terpene derivative amines are employed as fuel antioxidants and in the production of medications and pesticides. The author reviews their discovery since first found by Leuckart in 1887 until the present. Leuckart's reaction of camphor with formamide has remained a standard process, with synthesis of amines by oxime reduction being of interest for studying the stereochemistry of endo- and exomorphic forms. Ketone oximes are reduced to form various caranes and pipanes. While primary amines are obtained in such reactions, there are no descriptions of secondary amines being so obtained. The Leuckart reaction is used to reduce aldehydes and ketones with formamide and formic acid; a mixture of formamide with ammonium formate or ammonium carbonate and 85-90% formic acid can be used to produce amines. Although it is the basic method, it has such limitations as the need for two stages and for long heating of the reacting mixture. Also, unsaturated aldehydes and ketones of terpenes form isomers and tar. In reduction amination of terpene ketones, the most effective catalyst, by yield and selectivity, is platinum, followed by palladium and Raney nickel. A common method here is

a two-stage synthesis of N-substituted terpene amines, used to produce bornylamines from camphor and aliphatic or aromatic nitriles. A recent process for reduction amination of camphor by formamide in a hydrogen stream in the presence of a copper-aluminum catalyst produced N-methyl-substituted amines in a single stage for the first time. References 98: 23 Russian, 75 Western.
[271-12131]

UDC 541.128

CATALYSIS, AN IMPORTANT MEANS FOR CONSERVING RAW MATERIALS AND ENERGY AND IMPROVING PRODUCT QUALITY

Moscow ZHURNAL VSESOYUZNOGO KHIMICHESKOGO OBSHCHESTVA IM. D. I. MENDELEYEVA in Russian Vol 27, No 3, May-Jun 82 pp 267-274

BORESKOV, G. K., director, Institute of Catalysis, Siberian Branch, USSR Academy of Sciences; Chairman of the Scientific Council for Catalysis, Siberian Branch, USSR Academy of Sciences, and of the Scientific Council for Problems of Catalysis and Its Industrial Uses, USSR State Committee for Science and Technology; chief, Department of Catalysis and Adsorption, Chemistry Faculty, Novosibirsk State University

[Abstract] The author reviews applications of catalysts in chemistry, petroleum refining and petrochemical production, showing the savings realized in resources and manpower and stressing the need for further advances. His report is divided into sections on new research methods such as Auger-, X-ray- and photoelectron spectroscopy for precise determination of electron bond energy, transitional catalysis related to side reactions, using the examples of oxidation of sulfur dioxide in mass production of sulfuric acid and air pollution control, and catalysis by fixed complexes, which involve catalysts that are attached to solid carriers, thus avoiding the problem of separating catalysts from final products of reaction. Varying the composition of fixed catalysts permits high activity and selectivity. Other topics in the author's survey are permeable crystalline catalysts, such as synthetic zeolites, which have large enough dimensions for reacting substances to penetrate, and photocatalytic methods for converting the sun's energy into chemical energy. Among zeolites, Socony-Mobil's ZSM is discussed as an example of a super-silica component of stable catalysts. Such active, stable catalysts are being used to produce liquid hydrocarbon fuels from methanol and natural gas. Figures 15; references 27: 17 Russian, 10 Western.
[279-12131]

CHEMICAL INDUSTRY

NEW TECHNOLOGIES FOR CHEMICAL PRODUCTION

Moscow IZVESTIYA in Russian 9 Jun 82 p 2

[Article by Academician G. Boreskov, director of the Institute of Catalysis, Siberian Department, USSR Academy of Sciences, and Yu. Matros, laboratory chief and doctor of technical sciences, Novosibirsk, in the column "Science for Production": "Taming the 'Thermal Wave'--Energy-Saving Technologies Developed for Chemistry"]

[Text] A modern industrial apparatus for a daily production of 1000 tons of sulfuric acid, an important component of fertilizers, can reach a height of 40 meters. On the exterior of the apparatus there are expensive steel heat converters with a working surface area of tens of thousands of square meters. The total weight of the metal used in construction can reach 1500 tons.

An apparatus of the same capacity, planned for use in a new, so-called nonstationary production system, weighs approximatedly one-tenth that. No less important is the advantage that it can process and preserve gases resulting from nonferrous and ferrous metallurgy that cannot be used immediately. Processing of these gases allows recovery of several million tons of sulfuric acid and pyrite, which represents a huge saving of energy.

This is one of the results of new developments at the Institute of Catalysis of the Siberian Deaprtment, USSR Academy of Sciences, obtained on the basis of fundamental research on nonstationary process in catalytic systems.

Increased efficiency, reduced energy consumption per unit of production, and decreased cost prices are all demands of our time. The importance of solving these problems was emphasized by comrade L. I. Brezhnev in his appearance before the November (1981) Plenum of the CPSU Central Committee. Staff personnel at the Institute of Catalysis of the Siberian Department, USSR Academy of Sciences are working on solutions in the field of chemical manufacturing. The so-called "nonstationary" technologies that are being developed permit considerable reductions in capital expenditures, increased output of useful chemical products, and elimination, or significant reduction, of fuel consumption. They also open up the possibility of creating inexpensive means of cleaning up industrial wastes that are sent into the atmosphere.

Today, chemists, in cooperation with technologists and mathematicians, can determine the optimal conditions for carrying out a technological process. If all processes involved in the chemical industry could be carried out under optimal conditions, the total economic effect would constitute billions of rubles a year. Why is it then that in practice, in the majority of cases, chemical equipment operates at a level far from optimal?

The efficiency of a catalyst is determined by the composition and temperature of the mixture in the reactor. For example, if a reaction results in the production of heat, then the temperature will rise in proportion to the quantity of raw material being processed. An optimal system often requires just the opposite: a lowering of the temperature. It is impossible to achieve the most advantageous conditions for the chemical processes using the traditional stationary technological methods. Their inadequacy can be only partially compensated for by erecting a costly apparatus with complicated attachments for removal and delivery of heat and materials.

The problem, as we see it, is complex. Even so, a practical solution has been found, thanks to the research done at the Catalysis Institute on catalytic processes in nonstationary conditions. What then is the key to the solution?

To put it very simply, a chemical reactor can be visualized as a cylinder full of small granules of the catalyst. A mixture of substances enters through one end of the cylinder. With the help of the catalyst, this mixture will become the final product. We managed to create conditions in which a thermal wave, having a particular temperature profile within a layer of the catalyst, could provide maximum speed in the formation of the desired product. The catalyst granules will heat up and cool off repeatedly. Switching the direction of entry of the reaction mixture will force the thermal wave to move alternately from one end of the reactor to the other, without leaving the space in which the reaction is taking place.

Practical application of this method in the chemical industry eliminates construction of complicated and expensive heat converters; it eliminates the significant energy consumption involved in the preparatory heating of the mixtures, and it permits the creation of temperature fields and working mixture concentrations that are close to optimal. The main reserves for increasing efficiency of catalytic processes are hidden in a more complete exploitation of the possibilities of the catalyst itself.

At the Institute of Catalysis mentioned above, experimental work is being done on different methods of creating nonstationary conditions for catalysts and reactors. Several of these methods have already passed tests conducted at large experimental-industrial units. One of these is a method for obtaining sulfuric acid in an apparatus that works on the system of inserting the working mixture from alternating directions. This method is meeting with success at the scientific-manufacturing "Minudobreniye" Association and at an association of the same name in the city of Voskresensk. Preparations are already being made for the design and construction of large industrial installations employing this system.

The USSR Ministry of Nonferrous Metallurgy has also become interested in new methods for sulfuric acid production. The utilization of waste product gases is impossible with traditional methods because the concentration of sulfur dioxide is so low that no useful components can be extracted.

Plans have already been drawn and preparations for construction of new industrial units have begun for combines in Krasnoural'sk and Noril'sk. Production should begin as early as 1982. Utilization of the new method in nonferrous metallurgy will provide means for producing an extra several million tons of inexpensive sulfuric acid per year; and even more important, air pollution by this harmful gas will also be eliminated.

The Institute of Catalysis is working with the State Instutute of the Nitrogen Industry to come up with a process for synthesizing ammonia, using "nonstationary" technology. Ammonia is used as a base for making nitric mineral fertilizers. This will help reduce construction costs and will utilize practically all the heat from the chemical reaction.

The Institute of Catalysis has also begun working with the Scientific Research and Planning Institute for Sulfur, in L'vov, on obtaining sulfur from hydrogen sulfide.

The Institute of Catalysis is working with many institutes and organizations of the ministries of the metallurgical and chemical industries in developing nonstationary methods for inexpensive detoxification of gaseous waste products that contain carbonic acid, sulfur dioxide, acetone, methanol, formaldehyde, and many other chemical compounds. Among these organizations, we should mention the Special Design-Technology Bureau of Catalysts (in Novosibirsk), the inter-industry coordinating scientific research laboratory for environmental protection of the Ministry of the Chemical Industry, Tekhenergokhimprom (in Novosibirsk), and the Novosibirsk medical preparations factory. Systems for complex purification of gases for the Chelyabinsk metallurgical factory and the Magnitogorsk metallurgical combine have deen developed with the energy purification section of Scientific Research and Planning Institute of Ferrous Metallurgy. These systems do not require heat to warm up the gases so a large amount of valuable metal can be conserved, since no heat transformers are needed.

Apparatuses designed for nonstationary processes will have broad applications in industry through the utilization of heat from the chemical reactions.

New catalytic methods will help limit irretrievable heat loss in various branches of the national economy.

Work on the practical applications of nonstationary processes has just begun, but already it is clear that for rapid and successful introduction of these methods into industry, it is essential to see to the output of fast-acting secure fittings. Our machine constructors are up to this task.

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CSO:: 1841/290

CHEMICAL PLANT UNDER CONSTRUCTION

Yerevan KOMMUNIST in Russian 15 Jun 82 p 3

[Novosti Press Agency (APN) release: "Chemical Plant Under Construction"]

[Text] A large chemical plant designed by the Japanese firm TEK is being built in Novgorod, with the collaboration of Japanese specialists directing the installation work. The plant will have a production capacity of 550,000 tons of mineral fertilizers per year. The ferilitzers will have a high content of nitrogen, phosphorus and potassium. The plant will be part of the Novgorod "Azot" Association. [Avove paragraph in bold face]

Oleg Shalin, Soviet director of the project, said, "The Japanese firm's design interested us because it employs a technology that does not include the use of sulfuric acid, a product that is becoming scarce. On the other hand, the nitric acid method of decomposing apatite raw material for the production of complex mineral fertilizers has a great future, since nitric acid can be obtained in practically unlimited quantities. The Takhmashimport Association for foreign trade has contracted with TEK for the construction of five such plants in our country. The Novgorod plant will begin production in the second half of this year."

APN correspondent Aleksandr Turundayevskiy asked the director of the Japanese specialists, Hayashi, who is also an engineer, how he evaluated the cooperation between the TEK firm and the USSR.

"We have had a business relationship with the Soviet Union for the last 15 years. Our firm has taken part in the design and construction of more than 40 chemical enterprises. We are satisfied with the progress of our work here in Novgorod. Eighty percent of the general construction has been completed and about half of the technological equipment has been installed. We are pleased that two ammonia production plants, built according to the same design as that for the Novgorod 'Azot' Association plant, are running smoothly."

Yuriy Ivanov, general director of the Novgorod "Azot" Association said, "The fact of our long years of cooperation with the Japanese firm, TEK, speaks for itself. We have no complaints about the equipment or the technology, and in general they are better than what is produced by other foreign firms. We plan to expand our cooperation with the Japanese."

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CSO: 1841/290

BRIEFS

POLYMER IN PLACE OF METAL--Dzerzhinsk, Gor'kovskaya Oblast--The polymer material, black polycarbonate, is used in many branches of the national economy. It has good molding qualities, a high heat resistance, and it is resistant to many chemical substances. It is no accident that this polymer has replaced high quality metals in a number of products. The "Zarya" chemical equipment factory in Dzerzhinsk produces polycarbonate. Recently that collective achieved remarkable success by delivering to consumers material with the Emblem of Quality. This will promote high quality and reliability in all the articles the factory produces. [By SOTSIALISTICHESKAYA INDUSTRIYA correspondent V. Noskov] [Text] [Moscow SOTSIALISTICHESKAYA INDUSTRIYA in Russian 10 Jul 82 p 2] 9967

PRODUCTION CAPACITIES GROWING--Tul'skaya Oblast--The Yefremov chemical factory has put out its first tons of production. After the new sulfuric acid production reaches its projected capacity, the enterprise will supply agricultural workers with no less than one million tons of fertilizers. This does not, however, exhaust the contribution made by Yefremov chemists to realization of the food production program. This year the factory will begin manufacturing liquid complex fertilizers. Next in line is a unique production of unrecycled fodder phosphates. [By V. Anikeyev] [Text] [Moscow SOVETSKAYA ROSSIYA in Russian 16 Jul 82 p 1] 9967

CSO: 1841/290

UDC 678.06:63

POLYMERS AND THE FOOD PROGRAM

Moscow PLASTICHESKIYE MASSY in Russian No 6, Jun 82 pp 3-5

ABRAMOV, V. V. and ZHARKOVA, N. G.

[Abstract] To fulfill Party demands for development of agriculture using all industrial and scientific means, the plastics industry has expanded the portion of its products intended for food processing from 2% in 1965 to 12% in 1981, or from 5 to 145,800 tons. This has released metals, woods and glass for other economic uses and provided corrosion resistant, lightweight equipment for many agriculturel uses. Polyethylene sheeting has been developed with higher light stability for greenhouses and hothouses. These join PVC sheeting that is resistant to atmospheric conditions, and reinforced plastic sheeting for use in temporary storage structures and the like. Other important applications of plastics include pipes and hoses for soil heating, irrigation, land drainage and other liquid transport. Square pipe is made for metered bird feeding and pressure transmission of fluids. The "PLASTIK" Scientific Production Association will begin producing reinforced hoses from 6 mm to 63 mm in diameter during the current year. Packages for strength and appearance are being designed and produced for agricultural products: they will preserve taste and nutritive values of foods. A necessary area for development is in packages for sterilized, pasteurized and frozen products that will be durable during these processes. Liquid-proof paper containers are being replaced by thin low-pressure polyethylene for milk and meat products. Other development of combinations of polymers is susgested.
[266-12131]

UDC 678.06:63:69

EFFECTIVENESS AND PROSPECTS FOR USING POLYMER MATERIALS IN AGRICULTURAL CONSTRUCTION

Moscow PLASTICHESKIYE MASSY in Russian No 6, Jun 82 pp 6-7

SYTNIK, V. I., ORDYNSKAYA, T. M., MOSKVIN, D. F., CHERNYAK, I. S. and TATSIY, V. I.

[Abstract] The authors discuss replacing traditional metal, wood and concrete construction with plastics for housing poultry and animals and protecting agricultural products and fertilizers, particularly where temporary structures are feasible. Tobacco drying, sheep folds and storage of fertilizer until application are typical uses where significant savings can be achieved with no less effectiveness, using polymer thermoplastics with fiberglass reinforcement. A problem that requires solution in such structures is their short useful life due to ultraviolet ray damage; their poor insulating properties indicate use of these materials where heating is not a serious consideration. Fibergalss of phenol formaldehyde has been used for insulated panels in poultry houses, cattle pens, manure storage and mushroom chanbers. With effective heating, such structures have the advantages of easy disinfection and an improved microclimate. So far, however, such structures have failed to utilize the strength of fiberglass completely, since the bearing walls are still made of traditional materials. Advances in use of fiberglass continue. [266-12131]

UDC 678.742.2-19-416.01:537

LIGHT-STABILIZED POLYETHYLENE SHEETING WITH INCREASED ULTRAVIOLET RADIATION TRANSMISSION

Moscow PLASTICHESKIYE MASSY in Russian No 6, Jun 82 pp 7-8

VASILENOK, Yu. I., LAGUNOVA, V. N., SOLOV'YEVA, N. P., LESNYKH, O. D., YERMAKOV, Ye. I., KOTOVICH, I. N., YEMEL'YANOVA, V. A. and RUDNITSKIY, V. N.

[Abstract] Introduction of antioxidants to polyethylene sheetings used in agriculture cuts transmission of biologically-active ultraviolet radiation in the 300-330 nm range, thus hindering the tempering of seedlings. To solve this problem, the authors tested high pressure polyethylene with non-ionogenic surface-active oxyethylated octadecylamine and monoethyl amide of aliphatic acids of the C_{10}-C_{18} fraction. The stabilizer was o,o-diphenyldithiophosphate of nickel. Industrial light stabilizer 0,05% 2,hydroxy-4-alkoxy-benzophenone does not transmit the ultraviolet rays needed for sprouting; that used in the present study greatly increased transmission of those rays, but its stabilizing capability was insufficient. The addition of non-ionogenic surface-active substances corrected this problem and transmitted as much ultraviolet light

as plain polyethylene. While the latter lasted but 3-4 months, the stabilized sheeting of the test product lasted 9 months while transmitting 60% of the desired radiation (compared to 78% for ordinary sheeting). Savings of 800-900 rubles per ton were projected. References 2 (Russian).
[266-12131]

UDC 678.742.2-405.8:631.589.2

POROUS FILM SUBSTRATE FOR SPROUTING PLANTS

Moscow PLASTICHESKIYE MASSY in Russian No 6, Jun 82 pp 8-9

YERMAKOV, Ye. I., BOGDANOV, V. S., KOTOVICH, I. N., RUDNITSKIY, V. N., LAGUNOVA, V. N., SOLOV'YEVA, N. P. and VASILENOK, Yu. I.

[Abstract] Noting that a three-dimensional medium causes difficulties in hydroponics in even feed of water, minerals and air, the authors developed a low-cost hydrophilic film based on an antistatic polymer containing ethylene homo- or copolymers and a non-ionogenic surface-active substance, with a supplementary quantity of the oxyethylated fraction of dioxine alcohols. Either a hydrophilic polyethylene or an ethylene + vinylacetate copolymer with hydrophilic additives was used. High-dispersion NaCl, $Ca(NO_3)_2$, KNO_3, KCl and $MgSO_4$ salts were used to make capillaries in the film. Results showed the flow of water and minerals using this film to be fully satisfactory for a variety of seedlings. It was tested for "Ottawa-60" tomatoes in an intensive light cultivation environment, with a resulting 46% increase in yeilds while water use was some 86% that of a control plot. References 6 (Russian).
[266-12131]

UDC 678.742.2-416.002.237.004.3

'TERMOPLEN-2,' A NEW MATERIAL FOR PACKING MINERAL FERTILIZERS

Moscow PLASTICHESKIYE MASSY in Russian No 6, Jun 82 pp 13-14

PEREPELKIN, V. P., OSTAPCHUK, S. V., YURKEVICH, V. G., NESTEROVA, N. V. and FEDOTOVA, L. P.

[Abstract] To decrease losses in fertilizer handling and transportation, the authors studied radiation-chemical modification of polyolefin packing material to preserve the desired qualities and eliminate shortcomings of the polymer, such as viscosity, cracking and damage by organic solvents. The radiation modification permitted use of thinner films and cheaper polymers for heat-, frost- and waterproof packaging. The fertilizer sacks produced proved to be more durable than those in a control group, with less weight and thickness. The authors project savings for packaging fertilizers in the USSR at 5.6 million rubles.
[266-12131]

UDC 678.06:63

PLASTICS FOR PRODUCING AGRICULTURAL MACHINERY PARTS

Moscow PLASTICHESKIYE MASSY in Russian No 6, Jun 82 pp 19-20

MAMEDOV, R. I., SHIBANKOV, V. M., SHEMBEL', N. L. and SIMONOV-YEMEL'YANOV, I.D.

[Abstract] The corrosion resistance and material savings potential of plastics make them highly desirable substitutes for metals in certain bearings, liquid containers, valves, fertilizer spreaders, etc. In selecting polymers, however, such factors as sun exposure and load must be considered. The "PLASTIK" and "PLASTPOLIMER" Scientific Production Associations have developed containers for fertilizer spreaders that are resistant to atmospheric and corrosive factors, using ABS-2020 modified with effective light stabilizers. An ethylene + propylene + alpha-butylene (SEP-3) copolymer proved to be the most promising combination for a fertilizer spreader for ammonium-potassium nitrate, posassium salt and superphosphate. The Moscow Institute for Precision Chemical Technology imeni M. V. Lomonosov has developed a greaseless plastic graphite bearing that has greater durability than lubricated counterparts. References 2 (Russian).
[266-12131]

UDC 330.341.4.66+66.004.18

CHEMIZATION OF NATIONAL ECONOMY, AN IMPORTANT MEANS FOR CONSERVING MATERIAL, ENERGY AND HUMAN RESOURCES

Moscow ZHURNAL VSESOYUZNOGO KHIMICHESKOGO OBSHCHESTVA IM. D. I. MENDELEYEVA in Russian Vol 27, No 3, May-Jun 82 pp 257-260

ROSTUNOV, V. F., chief, Administration of Science and Technology, Ministry of the Chemical Industry

[Abstract] The author reviews chemical advances as labor- and resource-conserving developments in producing capital equipment and consumer goods, agricultural packaging products, plastics and resins, mineral fertilizers and chemical means of plant protection. Other advances are in paints, synthetic oils, leather substitutes and an assortment of shipping and packaging. Plastics in construction are freeing non-ferrous metals, wood and other traditional materials. They can be produced with from 2.2 to 2.5 times less energy than corresponding metals, thus providing another saving. Chemical fibers have a similar impact on the textile industry. The quality and durability of paints and varnishes can be improved along with savings in production costs by using a variety of chemicals. Synthetic edible oils and soaps reduce the need for such products from plants and animals. The leather and clothing industries are receiving synthetic products that substitute for essentially all types of natural products.
[279-12131]

UDC 621.311.1.004.18:66.013

ENERGY SAVING PROCESSES IN CHEMICAL INDUSTRY

Moscow ZHURNAL VSESOYUZNOGO KHIMICHESKOGO OBSHCHESTVA IM. D. I. MENDELEYEVA in Russian Vol 27, No 3, May-Jun 82 pp 275-281

KLIMENKO, V. L., doctor of economic sciences, chief, Department of the Economics and Organization of Chemical Production, Leningrad Technological Institute imeni Lensovet

[Abstract] Citing the urgent need for conserving fuel and energy, the author reviews Soviet efforts to save 160-170 million rubles, as mandated by the 26th CPSU Congress. Topics include application of energy-saving technology and gradual phasing out of antiquated, wasteful equipment, increased use of diesel engines, use of secondary energy resources and application of new methods of generating electrical energy. Estimates show that the Soviet chemical and petrochemical industries use 13.1% of the country's fuel and energy resources to produce about 7% of its industrial goods. Ways of perfecting technology to decrease energy consumption include optimal choice of raw materials, use of improved catalysts and more effective methods for obtaining finished physico-chemical products, and wide application of combined chemical processes, equipment and products where one process yields two or more useful products. Examples of the latter are oxosynthesis of aldehydes along with hydration to obtain both aldehydes and alcohols for various uses, and combining processes for obtaining phosphorus from phosphorites and phosphoric acid so that the heat produced by phosphorus oxidation can be used in reducing the phosphorus. The author also calls for use of improved equipment and progressive methods of accounting and utilization. Improved use of energy resources involves maximizing use of byproducts and secondary energy, from such sources as waste furnace gasses, steam from rectification columns, heat from cooling water or distilling liquids, slag and burning waste, etc. Organizational needs are also discussed. Figures 2; references 12: 11 Russian, 1 German.
[279-12131]

COMBUSTION

UDC 543.461:662.767

STRUCTURE OF HEXANE FLAME FRONT

Moscow KHIMICHESKAYA FIZIKA in Russian No 6, Jun 82 (manuscript received 28 Sep 81) pp 838-841

MANZHOS, V. K., KOLESNIKOV, B. Ya. and KSANDOPULO, G. I., Kazan' State University imeni S. M. Kirov, Alma-Ata

[Abstract] Results of this study with hexane, in accordance with those of a previous study using propane, indicate that the main chemical reactions causing fuel breakdown occur not in the luminous portion but in the cooler darker zone of the flame. The entire combustion zone is about 3 mm long and increases with increasing carbon number of the hydrocarbon fuel. The carbon chain-length, however, is only one of several factors controlling the flame width. Plots of various parameters across the flame zone show the following (the zero point is considered to be the internal boundary of the luminous zone; distance is considered positive in the direction of increased combustion): Oxygen concentration becomes zero at about 0.3 mm; water and CO_2 reach a maximum about 0.5 mm and remain high. H_2, CH_4, C_2H_2, C_2H_4 and HCHO peak about -0.2 mm then decrease. The higher hydrocarbon homologs peak earlier in the zone: C_2H_6 at about -0.7 mm; C_3H_6 and C_3H_8 at about -1.2 mm. C_6H_{14} decreases to zero at about -0.3 mm. Calculated hydrogen atom concentrations in the cooler portion of the flame are on the order of 10^{14} particles/cm^3. Figures 2; references 9 (Russian).
[245-12027]

UDC 541.126

PROPOGATION OF LAMINAR FLAMES: ROLE OF H_2O_2 IN H_2-O_2 COMBUSTION SYSTEMS

Moscow KHIMICHESKAYA FIZIKA in Russian No 6, Jun 82 (manuscript received 24 Nov 81) pp 842-847

BASEVICH, V. Ye., BELYAYEV, A. A. and POSVYANSKIY, V. S., Institute of Chemical Physics, USSR Academy of Sciences, Moscow

[Abstract] A standard program is developed which provides for a very simple entry of different reaction mechanisms as a system of second-order differential equations. This permits a large body of experimental data to be used efficiently.

An equation is developed for the heat evolution and its change as a function of temperature. For the H_2-O_2 system, fifteen different reactions are considered. Pre-exponential factors A and activation energies E are listed for the forward and reverse reactions. Three specific cases are considered: i) a system of reactions not involving H_2O_2 (9 of the 15 listed reactions); ii) a system of reactions including only those which involve H_2O_2 (6 of the listed reactions); and iii) a system including all 15 listed reactions. In general, the formation of hydrogen peroxide in lean hydrogen-air mixtures decreases the concentration of active centers. Figures 2; references 18: 9 Russian, 9 Western.
[245-12027]

UDC 534.222.2

DETONATION LIMITS OF FUEL-AIR MIXTURES IN SMOOTH AND ROUGH PIPES

Moscow KHIMICHESKAYA FIZIKA in Russian No 6, Jun 82 (manuscript received 29 Dec 81) pp 848-853

BORISOV, A. A., GEL'FAND, B. Ye., LOBAN', S. A (deceased), MAILKOV, A. Ye. and KHOMIK, S. V., Institute of Chemical Physics, USSR Academy of Sciences, Moscow

[Abstract] The experimental study considered the effect of tube diameter and the composition of a propane-oxygen mixture on the detonation velocity, the concentration limits required for detonation and the wave structure. For H_2, CH_4, C_2H_4, C_3H_6, C_3H_8 and acetone, decreasing the fuel in lean mixtures or the oxygen in rich mixtures changes the detonation process from stationary to "knocking" [tn:literally "galloping"]. Both stable and unstable regimes are investigated. The range of concentrations capable of detonation and the rate of detonation decrease with increasing smoothness of the pipe. Conversely, the combustion rate of a turbulant mixture increases with increasing smoothness, leading to the rapid formation of a strong shock wave across the flame front. Of theoretical interest is that the detonation limit is only a weak function of both the activation energy and the diameter of the pipe (for diameters greater than a certain minimum value). Figures 6; references 7: 4 Russian, 3 Western.
[245-12027]

UDC 536.46+534.222.2

ACCELERATING COMBUSTION IN GAS MIXTURES

Moscow KHIMICHESKAYA FIZIKA in Russian No 6, Jun 82 (manuscript received 2 Dec 81) pp 854-858

GOREV, V. A. and MIROSHNIKOV, S. N., Institute of Chemical Physics, USSR Academy of Sciences, Moscow

[Abstract] Flame propagation around a turbulence-inducing screen obstacle was studied during the combustion of stoichiometric mixtures of oxygen or air with hydrogen. The flame, after passing through the screen and travelling a distance equal to about twice the screen radius, had a burning rate which was stable but greater than the initial rate. Increasing the gage of the wire, decreasing the size of the screen apertures and increasing the size of the screen caused the flame to accelerate. The maximum rate of combustion for the H_2-air mixture after the screen was 250 m/sec; the H_2-O_2 mixture detonated. Figures 3; references 8: 5 Russian, 3 Western.
[245-12027]

FERTILIZERS

UDC 633.72:546.711/.717

USING FERTILIZERS CONTAINING MANGANESE ON TEA PLANTATIONS

Moscow KHIMIYA V SEL'SKOM KHOZYAYSTVE in Russian No 5, May 82 pp 20-24

GODZIASHVILI, B. A., candidate of agricultural sciences, and CHEBOTAREVA, M. V., Chakvsidy Branch, All-Union Scientific Research Institute for Tea and Sugar Crops

[Abstract] Fertilizers have long been used to increase tea and citrus yields in the red soils of humid, subtropical western Georgia, but acid ammonia salts have brought increasing acidity to those soils and freed bases. With annual nitrogen, phosphorus and potassium fertilization, microelements have come to be limiting factors that affect yields. The authors studied bound and free manganese in the soil in relation to pH and current fertilizer applications, on one of the oldest tea-growing sovkhozes in the area. Free manganese content was 3.4, 8.5 mg or merely traces per 100 g of soil. While manganese sulfate had a positive effect on soil in only trace amounts, it had less benefit where the soil contained 3.4 mg, and it suppressed growth in soil with 8.5 mg of manganese. Manganese content in tea leaves correlated with Mn content in the soil. Results pointed to the need for careful monitoring of manganese content before administering fertilizers on tea plantations. References 12: 11 Russian and 1 Western (by Soviet authors).
[258-12131]

UDC 631.811.941:633.3

USING COPPER SULFATE AS A MICROFERTILIZER FOR BARLEY, FODDER BEANS AND CORN IN KALININGRAD OBLAST

Moscow KHIMIYA V SEL'SKOM KHOZYAYSTVE in Russian No 5, May 82 pp 24-28

PANASIN, V. I., candidate of agricultural sciences, and SHIROKOV, V. V., Kaliningrad Oblast Planning and Research Station for Agrichemical Chemicalization

[Abstract] Soils in the Kaliningrad area include soddy podzolic, alluvial, alluvial-marshy and peat bog types. The authors studied the effects of copper sulfate on the title crops on each of these soils, in variants ranging from

2 to 8 kg per hectare and applications directly to the soil, as a presoak for seeds and as a spray on plants. In all cases positive results were registered, with variations related to previous cooper content of each particular soil type, as well as to peculiarities of the soils. Alluvial-marshy and peat bog soils reacted favorably to the fertilizer despite initially high content of free copper. The volume of the plowed soil layer and humus amounts also affected results. Application levels are recommended for soils with up to 12 kg/ha free copper content before fertilization; above that level, fertilizers containing copper are ineffective. The positive effects of copper-containing fertilizers on protein and amino-acid content were also related to soil type and the individual crop being tested. Both application to the soil and soaking of seeds were effective, but plant spraying was not. The net gain per ruble expenditure ranged from 2.08 rubles to 10.96 rubles.
[258-12131]

UDC 631.83+631.85

USING POTASSIUM AND PHOSPHORUS FERTILIZERS ON IRRIGATED GRASS PASTURES IN THE NON-CHERNOZEM ZONE

Moscow KHIMIYA V SEL'SKOM KHOZYAYSTVE in Russian No 5, May 82 pp 31-33

KULAKOV, V. A., candidate of agricultural sciences, and BALAYEVA, O. M.,
All-Union Scientific Research Institute for Feeds imeni V. R. Vil'yams

[Abstract] While recognizing the need for complete fertilizers on pastureland, the authors note that high-powered phosphorus fertilizers can reduce microelement contents. To determine optimum applications, they conducted field tests at the Institute's Central Experimental Base (Moscow Oblast) on pasture containing orchard grass, timothy and fescue varieties, with 70-100% moisture content of the soil, a soddy podzolic moderately loamy type. In 1970 five tons of lime per hectare had been applied. Measurements before and after applications of potassium chloride indicated that the pasture's productivity was directly tied to the amount of free potassium in the soil, but if content surpassed 10 mg of K_2O per 100 g, the grasses utilized it erratically, with no increases in yield but merely accumulation of the mineral, accompanied by losses in calcium. It was determined that $N_{300}P_{60}K_{150}$ was the most beneficial application, providing 9-9.6 thousand feed-units per hectare. References 5 (Russian).
[258-12131]

UDC 631.83

DISSOLUTION RATE OF ENCAPSULATED FERTILIZERS

Minsk VESTSI AKADEMII NAVUK BSSR: SERYYA KHIMICHNYKH NAVUK in Russian No 3, May-Jun 82 (manuscript received 19 Mar 81) pp 98-102

OVSEYENKO, L. V., KORSHUK, E. F., ALEKSANDROVICH, Kh. M., Institute of General and Inorganic Chemictry, Belorussian Academy of Sciences

[Abstract] A study is made of the effect of treating granulated nitrogen fertilizers with various individual compounds and complex compositions -- including those produced in processing of various chemical production wastes -- with hydrophobicizing and film-forming properties, on the kinetics of dissolution of the nutrients in those fertilizers. A charge of urea was treated by spraying the granules with solutions of low molecular polystyrene, urea-formaldehyde resins (produced by joint condensation of urea and formaldehyde with the addition of a third component as a hardener), M-2 hardener and a saturated solution of copper sulfate in a quantity of 10% of the mass of the fertilizer. Treatment time varied from 5 hours to 30 minutes. The specimens were dried at 110°C and the treatment was repeated to produce multilayer coatings. The rate of dissolution of urea coated with a continuous film of a polystyrene melt was much lower than urea treated with a solution of polystyrene in chloroform, a result of the presence of capillaries formed upon evaporation of the solvent chloroform. Figures 2; references 5 Russian.
[282-6508]

UDC 631.81.003+658.56

DIRECTIONS FOR INTENSIFYING MINERAL FERTILIZER PRODUCTION AND IMPROVING QUALITY

Moscow ZHURNAL VSESOYUZNOGO KHIMICHESKOGO OBSHCHESTVA IM. D. I. MENDELEYEVA in Russian Vol 27, No 3, May-Jun 82 pp 250-256

MEN'SHOV, V. N., chief of Administration of Science and Technology, Ministry of Mineral Fertilizer Production

[Abstract] The author reviews past and projected efforts in producing fertilizer in the light of resolutions of the 26th CPSU Congress. Chemical means of plant protection are expected to increase harvests and raise labor productivity 30%. Soviet mineral fertilizer production has more than tripled, to 24.8 million tons, from 1965 to 1980. Further increases are planned, with special emphasis on chemical means of plant protection. Major investments are planned for expansion, reconstruction and technical reequipping of enterprises, rather than for new palnts. A technical objective is fertilizer with balanced nitrogen, phosphorus and potassium content. Phosphorites from the Yegor'yev, Verkhnekamsk and Polpinsky deposits are basic sources for nonchernozem fertilizing, but other concentrated complex fertilizers, including

superphosphates, are being developed. By-product fertilizers with low content of needed minerals but good economic effects are also being produced, with the product mix including by-products along with high quality "ammophos," "nitroammophoska" and "kristallin." Phosphates for animal feed are also being stressed. Liquid complex fertilizers such as 10:34:0 and anhydrous ammonia, and products containing trace elements of copper, zinc, manganese, cobalt, iodine and molybdenum represent other directions of development. Major efforts are also being directed at better shipping, handling and storage parameters for bulk fertilizers. Low-quality but abundant phosphates from the Karatau basin are being exploited, as is natural sulfur. Automation is being advanced. References 4 (Russian).
[279-12131]

UDC 547.491.8.07/088.8/

REACTION OF CYANAMINO-sim-TRIAZENSE WITH HALOGEN NITRILES

Yerevan ARMYANSKIY KHIMICHESKIY ZHURNAL in Russian Vol 35, No 5, May 82 (manuscript received 25 Mar 81) pp 322-325

DOVLATYAN, V. V., GYUL'BUDAGYAN, L. L. and AMBARTSUMYAN, E. N., Armenian Agricultural Institute

[Abstract] A study was made of the interaction of potassium salts of N-cyanamino-4,6-substituted-sim-triazenes with chloronitriles and methylchloroacetate. It was found that these salts (I) yield with chloroacetonitrile and methylchloroacetate products of nucleophilic substitution (II, III), while with a α, β-dichloropropionitrile they yield products of dehydrochlorination. The interaction of certain I salts with sodium iodoacetate was studied. It was found that the reaction occurs smoothly and forms N-cyano-N-carboxymethyl derivatives in dimethylformamide or dimethylsulfoxide. References 4 (Russian).
[280-6508]

UDC 541.49+547.26.118

THERMODYNAMIC PARAMETERS OF FORMATION OF NICKEL COMPLEXES WITH DITHIOACIDS OF PHOSPHORUS

Leningrad ZHURNAL OBSHCHEY KHIMII in Russian Vol 52, No 6, Jun 82 (manuscript received 23 Oct 81) pp 1323-1324

OVCHINNIKOV, V. V., GARIFZYANOV, A. R., TOROPOVA, V. F. and CHERKASOV, R. A., Kazan'State University imeni V. I. Ul'yanov-Lenin

[Abstract] The stability of chelate nickel complexes in which the ligands are derivatives of $ABPSS^-$ dithioacids of phosphorus was shown earlier to depend on the spatial and electronic structure of the A and B substituents. The thermodynamics of such reactions have not been covered. The authors determined the contributions of enthalpic and entropic components in the overall free energy of complex formation. The calorimetric data show that complexes

formed by nickel ions and anions of acyclical and cyclical dithiophosphates, and complexes with derivatives of dithiophosphoric acids, are generally characterized by lesser amounts of enthalpy and entropy of complex formation than found in complexes with dithiophosphinate ligands. Dithio-phosphates, phosphonates and phosphinates of nickel are judged to belong to different reaction series. References 8: 6 Russian, 2 English.
[382-12131]

UDC 547.245'246'258.11'81'491.8

SYNTHESIS OF BIS-(eta^5-CYCLOPENTADIENYL)VANADIUM DIALLYLISOCYANURATE

Leningrad ZHURNAL OBSHCHEY KHIMII in Russian Vol 52, No 6, Jun 82
(manuscript received 13 Jul 81) pp 1334-1338

RAZUVAYEV, G. A., GORDETSOV, A. S., LATYAYEVA, V. N., PERESHEIN, V. V., MOROZOV, O. S. and DERGUNOV, Yu. I., Gor'kiy Medical Institute imeni S. M. Kirov

[Abstract] Earlier, the authors had synthesized derivatives of diallylisocyanurate containing silicon, germanium and tin, and determined that R_3Si fragments combined with the symmetrical triazine cycle through the oxygen atom, while R_3Ge and R_3Sn groups coordinated through the nitrogen atom. To obtain vanadium compounds with the triazine ring and study the fate of the Cp_2V fragment, they conducted reactions of dicyclopentadienylvanadium with trimethylsilyl-, dimethylsilyl-, triethylgermyl- and tributylstannyldiallylisocyanurates. The basic product of all reactions was the same, dicyclopentadienylvanadium allylisocyanurate. Its properties are described. Chemical procedures are given in the experimental section. References 6: 3 Russian, 3 Western.
[283-12131]

ORGANOPHOSPHORUS COMPOUNDS

UDC 547.341+547.544.3

[(HYDROXYDIPHENYLPHOSPHOROANILIDENE)TOSYLMETHYL]TRIPHENYLPHOSPHONIUM BROMIDE: STABLE ILIDE WITH HYDROXYL GROUP AT THE PHOSPHORUS

Moscow DOKLADY AKADEMII NAUK SSSR in Russian Vol 264, No 6, Jun 82
(manuscript received 10 Mar 82) pp 1396-1399

MASTRYUKOVA, T. A., ALADZHEVA, I. M., BYKHOVSKAYA, O. V., PETROVSKIY, P. V., ANTIPIN, M. Yu., STRUCHKOV, Yu. T. and KABACHNIK, M. I., academician, Institute of Heteroorganic Compounds imeni A. N. Nesmeyanov, USSR Academy of Sciences, Moscow

[Abstract] A study is made of the synthesis and crystalline structure of the first stable acyclic compound with a hydroxyilide group. The hydroxyilide was obtained with a yield of 92% by the action of an equivalent quantity of hydrogen bromide in ether on a conjugate phosphine oxide base which in turn was synthesized by oxidation of [(diphenylphosphino)tosylmethylene]triphenylphosphorane with potassium permanganate in a CH_2Cl_2-acetone mixture. The structure of the end product was verified by spectral studies and X-ray structural analysis. Figure 1; references 15: 8 Russian, 7 Western.
[268-6508]

UDC 541.49:542.943

OXIDIZING TRIPHENYLPHOSPHINE IN PRESENCE OF TRANSITION METAL COMPOUNDS

Leningrad ZHURNAL OBSHCHEY KHIMII in Russian Vol 52, No 6, Jun 82
(manuscript received 10 Dec 81) pp 1257-1260

FEDIN, V. P. and ROMANOVA, I. B., Institute of Biochemistry and Physiology of Microorganisms, USSR Academy of Sciences, Pushchino

[Abstract] There is a widely held hypothesis about the intermediate formation of a double bond iron-oxygen fragment to explain mono-oxidase activity of enzymes. The authors studied oxidation of triphenylphosphine (PPh_3) with such niobium and molybdenum fragments, and also with atmospheric oxygen in the presence of transitional metals. PPh_2 oxidizes well using niobeceneoxochloride

in an equal quantity of sodium naphthaline, with a good yield of triphenylphosphine oxide and bis-niobocene. The reaction with niobium complexes was conducted under vacuum in solvents from which gas was carefully removed, thus controlling the effect of atmospheric oxygen on the reaction. With atmospheric oxygen, niobocenechloride and PPh_3 unexpectedly yielded niobocenoxochloride and an oxide of triphenylphosphine. Modeling of monooxygenase enzymes containing cytochrome "P-450" as a prosthetic group was conducted on porphyrine complexes of transitional metals, yielding $O{=}Mo(OCH_3)\cdot(L)(VII)$ LH_2-mesoporphyrine (IX)-dimethyl ester, showing that that complex also oxidises PPh_3 with transfer of an oxygen atom from the oxocomplex to the substrate. In the presence of small quantities of $Cu(OCOCH_3)_2$, hemin or $FeCl_3\cdot 6H_2O$ and equal amounts of ascorbic acid, catalytic oxidation of PPh_3 by atmospheric oxygen is possible. References 11: 5 Russian, 6 Western.
[283-12131]

UDC 547.341

COMBINATION OF PHOSPHORUS TRIHALOGENIDES WITH METALLIZED INETHERS

Leningrad ZHURNAL OBSHCHEY KHIMII in Russian Vol 52, No 6, Jun 82
(manuscript received 14 Dec 81) pp 1431-1432

LUZIKOVA, Ye. V., KAZANKOVA, M. A. and LUTSENKO, I. F., Moscow State University imeni M. V. Lomonosov

[Abstract] Continuing previous research, the authors studied the reaction of phosphorus trichlorides and tribromides with trimethylsilyl(germyl)alkoxyacetylenes [the title inethers]. The reactions were new examples of combining phosphorus trihalogenides by short bonds, leading to new types of bis-elemental organic compounds, dihalogen 1-trimethylsilyl(germyl-2-halogen-2-alkoxyethenyl phosphines. The products obtained were confirmed by PMR and ^{13}C NMR, and structures by infrared and ^1H and ^{31}P NMR spectra. Reference 1 (Russian).
[283-12131]

UDC 547.298.0

REACTION OF HYDRAZINE WITH ESTERS OF PHOSPHORYLATED PHENYLCARBOXYLIC ACIDS

Leningrad ZHURNAL OBSHCHEY KHIMII in Russian Vol 52, No 6, Jun 82
(manuscript received 30 Dec 81) pp 1436-1437

ISMAGILOV, R. K., RAZUMOV, A. I. and BEZBORODOVA, T. A., Kazan' Chemical Technological Institute imeni S. M. Kirov

[Abstract] Studying methods of synthesizing the title compounds, the authors investigated anhydrous hydrazine's reaction with ethyl esters of alpha-diphenylphosphonylphenylacetic and alpha-diphenylphosphonyl-beta-phenylpropionic acids. With an excess of hydrazine and 125-130°C temperatures, the

phosphorus-carbon bond was broken, leading to formation of a hydrazide of diphenylphosphonous acid and N,N'-bisphenylacetylhydrazine, with the first ester, and a hydrazide of the corresponding acid with the second. An attempt to produce a hydrazide by reaction of the second ester with hydrazine hydrate failed. Chemical procedures are given. References 4: 1 Russian, 3 Western.
[283-12131]

UDC 547.298.3

PHOSPHAZOCOMPOUNDS WITH UNLIKE HALOGENS ON PHOSPHORUS ATOM

Leningrad ZHURNAL OBSHCHEY KHIMII in Russian Vol 52, No 6, Jun 82
(manuscript received 31 Jul 81) pp 1260-1265

GOLOLOBOV, Yu. G., GUSAR', N. I. and RANDINA, L. V., Institute of Organic Chemistry, UkSSR Academy of Sciences

[Abstract] The title compounds are of interest in studying reaction mechanisms and also as intermediate products in the synthesis of such compounds as polyphosphazenes. The authors synthesized dihalogen phosphazocompounds containing a tertiary butyl group at the phosphorus and a trimethylsilyl radical at the nitrogen. Halogenation of phosphines led to expected corresponding chlorine, bromine and iodine compounds, whose structure was confirmed by infrared and ^{31}P NMR spectral data. They were stable when heated. At room temperature symmetrical phosphazocompounds formed. When bromophosphine was mixed with phosphazosilane, a rapid halogen exchange took place at room temperature. The results indicated that the most likely path for forming these compounds led through phosphonium salts, but no certain proof was obtained. Chemical procedures are given in the experimental section. References 7: 4 Russian, 3 Western.
[283-12131]

UDC 542.91:547.1'118

STRUCTURE OF ACYLATED AND BENZOYLATED DERIVATIVES OF TRIMETHYL ESTER OF PHOSPHOACETIC ACID

Leningrad ZHURNAL OBSHCHEY KHIMII in Russian Vol 52, No 6, Jun 82
(manuscript received 23 Oct 81) pp 1265-1270

SAKHIBULLINA, V. G., POLEZHAYEVA, N. A. and ARBUZOV, B. A., Scientific Research Chemical Institute imeni A. M. Butlerov; Kazan' State University imeni V. I. Ul'yanov-Lenin

[Abstract] Previously, the authors had shown that the direction of acylation of metallic derivatives of the title ester depended on the nature of the metal and acylating agent. Study of keto-enol tautomerism showed that acylated

products were heavily enolized and consisted of ketone, E-enol and K-enol forms in solution. Their structures were studied by PMR and ultraviolet spectroscopy. In contrast to reactions with acetyl chloride, benzoyl chloride and n-nitrobenzoyl chloride reacted with sodium and methoxymagnesium derivatives of the title ester to form mono- and di-C-aroylated products. With n-nitrobenzoyl chloride, the dominating tendency was to form a diaroylated product. Among products of the tests the trimethyl ester of phosphonoacetoacetic acid underwent increased enolation when water or alcohol was replaced by isooctane. The analogous ester of phosphonobenzoylacetic acid existed only in ketone form. The lack of enolation of monobenzoylated derivatives of the phosphonoacetic ester gave evidence of the thermodynamic disadvantages of the enol form compared to the ketone form, apparently due to steric factors. Chemical procedures are given in the experimental section. References 9: 6 Russian, 3 Western.
[283-12131]

UDC 547.241+547.33

REACTION OF ARYL ESTERS OF DIPHENYLPHOSPHONOUS ACID WITH 1-NITRO-1-PROPENE

Leningrad ZHURNAL OBSHCHEY KHIMII in Russian Vol 52, No 6, Jun 82
(manuscript received 15 Sep 81) pp 1270-1277

GAREYEV, R. D., IL'YASOV, A. V., LEVIN, Ya. A., GOL'DFARB, E. I., MOROZOV, V. I., LOGINOVA, G. M., SHERMERGORN, I. M. and PUDOVIK, A. N., Kazan' Veterinary Institute imeni N. E. Bauman; Institute of Organic and Physical Chemistry imeni A. Ye. Arbuzov, Kazan' Branch, USSR Academy of Sciences

[Abstract] According to the general course of full esters of trivalent phosphorus acids reacting with 1-nitro-1-alkenes, each reagent in a balanced system is involved and the direction is determined by their respective reactive capabilities. Phosphoranes are generally unstable substances that can be isolated in mild reactions. Their behavior as cyclic derivatives of nitronic acids containing phosphorus is determined by a phosphorus atom in the alkoxy group. The authors sought to find a means of stabilizing such phosphoranes in the reaction of 0-phenyldiphenylphosphinite with 1-nitro-1-propene at temperatures of no more than 30-35°C. The products of the reaction were confirmed by infrared and PMR spectroscopy, ^{31}P NMR, gel-liquid and thin layer chromatography. In similar reactions, they discovered a new direction as 1-nitro-1-propene reacted with 0-aryldiphenylphosphinites, in which electrophile unsaturated reagents brought formation of oxides of diphenyl-alpha-cyanethylphosphine, 0-aryldiphenylphosphinates and corresponding phenols. Reactions of 0-aryldiphenylphosphinites with 1-nitro-1-propene included intermediate formation of an ion-radical pair via single electron transfer. The competition of phosphorane disintegration with the breaking of exo- and endocyclic P-0 bonds with an aryl substituent sees the former take precedence. Chemical procedures are given in the experimental section. Figures 2; references 19: 15 Russian, 5 Western.
[283-12131]

UDC 547.241+547.33

REACTIONS OF ALKYL ESTERS OF DIPHENYLPHOSPHONOUS ACID WITH 1-NITRO-1-ALKENES

Leningrad ZHURNAL OBSHCHEY KHIMII in Russian Vol 52, No 6, Jun 82
(manuscript received 14 Sep 81) pp 1278-1290

GAREYEV, R. D., IL'YASOV. A. V., LEVIN, Ya. A., GOL'DFARB, E. E., MOROZOV, V. I., SHERMERGORN, I. M. and PUDOVIK, A. N., Kazan' Veterinary Institute imeni N. E. Bauman; Institute of Organic and Physical Chemistry imeni A. Ye. Arbuzov, Kazan' Branch, USSR Academy of Sciences

[Abstract] Previously, the authors had established that in reactions of full esters of trivalent phosphorus acids with 1-nitro-1-alkenes, several directions of reaction take place and result in various mixtures. In the present study they give results of the title reactions, confirming results by infrared, PMR and ^{31}P NMR spectroscopy and thin layer chromatography. Phosphorane 2-methoxy-2,2-diphenyl-3-methyl-5-oxo-1,5,2-oxazophosphol-4-ene was unstable in thermal action and at its melting point, while in aproton solvents such as benzene, acetonitrile and dimethylsulfoxide and mild conditions, it formed other compounds rapidly. Homolytic stages in the reaction of O-methyldiphenylphosphinite with 1-nitro-1-propene at room temperatures and isomerization indicated a formation through radical pairs, with transfer of a single electron. Electron spin resonance pointed to formation of an anion-radical in the presence of 2-methyl-2-nitroisopropane. Formation of diphenylisopropenylphosphinoxide is explained by a protoproton shift in the zwitter ion and breaking of the C-N bond in the ilide obtained, with expulsion of a nitrite anion and a subsequent reaction like the second stage of the Arbuzov regrouping. The phosphorane apparently is a kinetically-controlled product of cyclization accompanied by a more favorable stereoisomer (with better thermodynamics). Chemical procedures are given in the experimental section. Figures 5; references 19: 10 Russian, 9 Western.
[283-12131]

UDC 547.26'118

REACTION OF ISOCYANATES AND ISOTHIOCYANATES OF DIMETHYLPHOSPHOROUS AND ALKYLENEPHOSPHOROUS ACIDS WITH ALKYLIDENECYANACETIC ESTERS AND TEHYLIDENEACETYL ACETONE

Leningrad ZHURNAL OBSHCHEY KHIMII in Russian Vol 52, No 6, Jun 82
(manuscript received 26 Aug 81) pp 1290-1296

KONOVALOVA, I. V.. MIKHAYLOVA, N. V., BURNAYEVA, L. A. and PUDOVIK, A. N., Kazak' State University imeni V. I. Ul'yanov-Lenin

[Abstract] Recently, the authors showed that the title compounds reacted with unsaturated compounds when the C=C bond was activated by two strong himinal electron acceptor groups. Continuing that work, they studied the reactions

of dimethyl esters of isocyanato- and isothiocyanatophosphorous acid with idene derivatives of cyanacetic ester $R^1R^2C=C(CN)COOC_2H_5$. Adduct structures were confirmed by infrared and ^{31}P and ^1H NMR using the difference $^1H-(^{31}P)$. Data confirmed the earlier course of the reaction. The most typical spectra came from the reaction of dimethylisocyanatophosphate with ethylidenecyanacetic ester. An azaphospholene and other products were also analyzed. Little heat (50°C) or retention at room temperature was necessary for the reactions. Spyrophosphanes obtained were unstable and decomposed even during PMR spectral recording. The compounds obtained were 3,3-disubstituted 1-methyl-2-methoxy-2,5-dioxy-4-cyano-4-ethoxycarbonyl-1,2-azaphospholane (80%) and 3,3-disubstituted 2,5-dimethoxy-2-oxo-4-cyano-4-ethoxycarbonyl-1,2-azaphosphol-5-enes (20%). Dimethylisothiocyanatophosphite reacted with corresponding alylideneacetic esters to form only 3,3-disubstituted 2-methoxy-5-methylthio-2-oxo-4-cyano-4-ethoxycarbonyl-1,2-azaphosphol-5-enes, while cyclic isocyanatophosphites reacted with ethylideneacetyl acetone to form unstable 7,7,8,8-tetrasubstituted 3-acetyl-5-isocyanato-2,4-dimethyl-1,6,9-trioxa-5$^{\text{lambda}^5}$-phosphanon-2-enes. References 8: 6 Russian, 2 Western.
[283-12131]

UDC 547.341

REACTIONS OF DIPHENYL- AND PHENYLETHOXYMETHYLENE AMIDOPHOSPHITES WITH ALLENYL PHOSPHONATES

Leningrad ZHURNAL OBSHCHEY KHIMII in Russian Vol 52, No 6, Jun 82
(manuscript received 21 Jul 81) pp 1296-1301

KHUSAINOVA, N. G., BREDIKHINA, Z. A. and PUDOVIK, A. N., Kazan' State University imeni V. I. Ul'yanov-Lenin

[Abstract] Cyclocombination of phosphorus-containing 1,3-dipoles and unsaturated compounds is a convenient method for synthesizing five-membered phosphorylated heterocycles. The title systems had not previously been studied. The authors investigated reactions of diphenylmethylamidophosphites with gamma-gamma-dimethylallenylphosphonates and cyclohexylidinevinylphosphates, obtaining unstable 2,2-dialkoxy-3-alkylideno-4-dialkylphosphono-5,5-diphenyl-1,2-azaphospholenes. Their conversion to azaphospholidines was accompanied by separation of alcohol. The tendency to hydrolytic separation of the P=N bond, noted previously, was confirmed as acyclical derivatives formed. Addition of water to the heterocyclic compounds brought formation of various monoesters. Phenylethoxymethylene amidophosphite was found to combine with allenyl phosphites forming unstable five-membered heterocycles, which were stabilized after N-alkylation and separation of alcohol. Chemical procedures are given in the experimental section. References 10: 6 Russian, 4 Western.
[283-12131]

UDC 547.794.2'118

ALCOHOLYSIS OF SEVERAL 4,5-BENZO-1,3,2-DIHETEROPHOSPHOLANES

Leningrad ZHURNAL OBSHCHEY KHIMII in Russian Vol 52, No 6, Jun 82
(manuscript received 23 Oct 81) pp 1302-1307

PUDOVIK, M. A., TERENT'YEVA, S. A., MIKHAYLOV, Yu. B. and PUDOVIK, A. N., Institute of Organic and Physical Chemistry imeni A. Ye. Arbuzov, Kazan' Branch, USSR Academy of Sciences

[Abstract] Studying reactions of 2-ethyl-4,5-benzo-1,3,2-oxazophosphane with alcohols, phenols, mercaptans and carboxylic acids, the authors previously fixed monocyclic phosphoranes with P-H bonds. This suggested that with proton donors, the title compounds would form intermediate phosphorane derivatives. The authors studied such reactions and monitered their results with ^{31}P NMR. 2-ethoxy- and 2-methoxy-4,5-benzo-1,3,2-oxazophospholanes reacted readily with alcohol at room temperature forming complete phosphites and spyrophosphorane with a P-H bond, and emitting ortho-aminophenol. They could be fixed spectrally before their disintegration into final products. 2-ethoxy-4,5-benzo-1,3,2-thiaphospholane reacted with ethanol when heated to produce triethylphosphite and aminothiophenol, which then reacted to form diethylphosphorous acid. Alcoholysis of 2-diethylamino-3-methyl-4,5-benzo-1,3,2-thiazaphospholane and thiazaphospholane in acid catalysis speeded reactions, while base catalysts slowed the alcoholysis. With 2-ethoxy-1,3,2-dioxaphospholane, basic catalysts speeded the reaction. Thus the nature of the cyclic fragment at the phosphorus affects the mechanism of the reaction. Chemical procedures are given in the experimental section. References 11: 7 Russian, 4 Western.
[8 -12131]

UDC 547.241

P-HALOGEN PHOSPHONIUM ALKYLIDES, PART 4: REACTIONS WITH AMIDES OF CARBOXYLIC, SULFO- AND PHOSPHORIC ACIDS

Leningrad ZHURNAL OBSHCHEY KHIMII in Russian Vol 52, No 6, Jun 82
(manuscript received 31 Jul 81) pp 1314-1318

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[Abstract] To further study new, highly reactive P-chlorophosphonium alkylides, the authors brought them into reactions with the title acids. With carboxylic acid amides, they behaved like chlorinating and dehydrating agents. With N-monosubstituted benzoic acid amides, they formed amidochlorides and phosphinoxides, with transfer of chlorine and oxygen atoms (together with hydrogen) between ilide and amide. Imidoylchlorides were readily dehydrochlorinating bases, so that primary amides of carboxylic acids converted into nitriles. N,N'-disubstituted ureas reacted with P-chlorylides to form carbodiimides.

Chlorinating and dehydrating properties of P-chlorylides were lacking in triphenylphosphonium ilides. The structures of the compounds obtained were confirmed by ^{31}P NMR spectra. Chemical procedures for these and other reactions are given in the experimental section. References 18: 7 Russian, 11 Western.
[283-12131]

UDC 547.241

STUDY OF REACTIONS OF COMPOUNDS OF CHLOROPHOSPHONIUM WITH HALOGENIDE ANIONS

Leningrad ZHURNAL OBSHCHEY KHIMII in Russian Vol 52, No 6, Jun 82
(manuscript received 6 Jul 81) pp 1318-1322

VENGEL'NIKOVA, V. N., TOMOKHIN, B. V., KALABINA, A. V. and DONSKIKH, V. I.,
Irkutsk State University imeni A..A. Zhdanov

[Abstract] Continuing a systematic study of halogenophile conversions of chlorides of tetracoordinated phosphorus, the authors studied reactions of derivatives like $R_nPCl^+_{4-n}\ X^-$ with halide salts of ammonium and alkaline metals as donors. Among results, tetrachlorophosphonium of tetrachloroaluminate did not react with potassium iodide. It was expected that introducing n-donors into the reaction would reduce electrophile properties of the halogen compounds formed, enabling reduction of the chlorophosphonium substrate by the effects of halogenide anions. Actually in the reaction of $PCl_4{}^+AlCl_4{}^-$ with potassium iodide in the presence of triethylamine or dioxane, a phosphorus trichloride formed. Its composition was determined by ^{31}P NMR. In the ready reaction of the aluminate with iodide salts of tetraorganylammonium, a dependence of yield on cation dimensions was noted. Reduction involving KBr occurred only in the presence of triethylamine. Thus the test reactions indicate that chlorophosphonium derivatives undergo halogenophile conversions only under the effects of soft halogenide anions. Similar results came with bromine compounds. Chemical procedures are given in the experimental section. References 14: 8 Russian, 6 Western.
[283-12131]

AEROSOL USED AGAINST MOSQUITOES

Moscow SEL'SKAYA ZHIZN' in Russian 24 Jun 82 p 4

[Article by G. Tur'yev: "Aerosol Used Against Mosquitoes"]

[Text] Syktyvkar (Komi ASSR) -- Herds of reindeer from farms in the republic have set off toward the Arctic Ocean. There they will feed on the rich pasture land of the tundra.

The land there is rich not only in food. Unfortunately, the tundra also has huge swarms of midges and gadflies, so a special expedition from the Izhmo-Pechora veterinary research station has departed for the reindeer feeding area. Its members are armed with medicinal preparations as well as a small cannon-like aerosol device. With this device, they can "fire" at the insects pestering the animals. A light cloud is emitted which the insects cannot tolerate. The reindeer are already accustomed to the "cannon shots" and they run eagerly toward the sound of the shots.

9967
CSO: 1841/290

CHEMICALS PROHIBITED FOR USE IN PERSONAL GARDENS

Moscow SEL'SKAYA ZHIZN' in Russian 24 Jun 82 p 4

[Article by E. Balayev, deputy director of administration of plant protection at the "Rossel'khozkhimiya" Association, in the column "Your Home and Garden": "Not To Be Used"]

[Text] After publication of information about the use of poisonous chemicals in the battle against plant pests and diseases, many readers are asking: out of the more than 100 products named that are in use on kolkhozes and sovkhozes, why are we allowed to use only a few of them in our own gardens?

The reason for this is that on large tracts of land, this treatment can be used without concern that the poisonous materials will fall on the neighboring fields. But in private garden plots, parsley and lettuce grow right next to currants or apple trees. There is no guarantee that when spraying trees and bushes, you can keep the chemicals from landing on greens and other vegetable produce.

It is especially dangerous to use DDT in your own garden. Its use in agriculture was prohibited 11 years ago, but some stores of this potent poisonous chemical have been preserved. DDT is extremely resistant to decomposition by environmental factors. It remains in the soil for a very long time. If you use it just once in your garden, you risk "reaping" the consequences of your carelessness for many years. Even in small quantities, DDT can have chronic toxic effects, damaging the liver, kidneys, and the nervous system. If it ends up in a mother's breast milk, it can interfere with normal growth and development of a nursing infant. Signs of DDT poisoning are headaches, dizziness, insomnia, loss of appetite, and rapid mental and physical fatigue.

Preparations containing hexachlorane also can have chronic toxic effects and cause damage to the nervous system. Hexachloranes are very stable: after a year in the soil, only one-fourth of their original quantity has been broken down. The presence of hexachlorane can be detected by its putrid odor and taste even in milk, butter, and eggs from chickens that have been fed on plants treated with hexachlorane. In areas where hexachlorane has been used, potatoes and other vegetables cannot be planted for four years.

We also prohibit the use of polychlorpinenes in private gardens, since it does not degrade well. The use of the herbicide cymazine is prohibited as well; even though it is not very toxic to humans, if it is used to kill weeds in between garden rows, nothing besides corn can be grown in that soil for many years. Furthermore, rain and ground water can carry the herbicide outside the boundaries of its original application.

In recent years, we have also removed cyneb, formalin, homicin, and sodium trichloroacetate from the list of chemicals approved for use by the general public. To prevent contamination of agricultural produce and the environment, use only those substances approved for general use. For information about those preparations, see the issues of this paper from 14 and 28 January and 11, 18 and 25 February of this year.

Not long ago, the following substances were added to the list of protective chemical products approved for retail sale to the public: actellic, ambush, bromophos, diazinon, methathion, oleocuprite, preparations numbered 30, 30A, 30C, 30CC, 30M, powdered sulfur, sumicidin, phosalon, cyanox, ethaphos, isophen, aphos, baileton, rovral', FDN, tiazon, diuron, dichloral urea, and semeron.

9967
CSO: 1841/290

UDC 632.951

EFFECTIVENESS OF PYRETHROID INSECTICIDES IN COMBATING CODLING MOTH

Moscow KHIMIYA V SEL'SKOM KHOZYAYSTVE in Russian No 5, May 82 pp 34-35

KHOLCHENKOV, V. A., candidate of biological sciences, Crimean Toxicological Laboratory of the All-Union Institute of Plant Protection

[Abstract] The authors sought to determine the technical and commercial effectiveness of the title insecticides and their effects on Arthropods in an apple orchard. They tested Ambush, Decis, Sumicydin, Ripcord and Cymbush, in a 20-year old orchard in the Simferopol area, which has Renet Simirenko apples, spraying a 3 + 2 schema -- three against the first generation moths, two against the second -- in 1979 and a 3 + 1 schema in 1980. Codling moth damage was determined on selected trees for both fallen and harvested fruit, and the insecticides' effects measured on useful and on plant eating insects. While all the insecticides were very effective in protecting the apples, they also promoted mass multiplication of various phytophagans, largely by killing off the acariphagans. Thus optimal timing and application methods are essential when using these insecticides, to prevent disturbing the biocenotic balance. Figure 1; references 2 (Russian).
[258-12131]

UDC 632.954:631.5

SOIL PREPARATION AND HERBICIDES IN CROP ROTATION

Moscow KHIMIYA V SEL'SKOM KHOZYAYSTVE in Russian No 5, May 82 pp 37-41

KHOLMOV, V. G., canaidate of agriculture sciences, MOKSHIN, V. S. and OVCHINNIKOV, P. P., Siberian Scientific Research Institute for Agriculture

[Abstract] In a fallow-wheat-wheat-corn-wheat-barley rotation, the authors studied long-term effects of herbicides and various soil preparation techniques on the number and type of weeds, yield and technical properties of the wheat produced. Plowing, disking and minimal soil preparation methods in various combinations were used. The herbicides tested included 2,4-D, Reglon, Bayalan,

Diameth-D, Methafen and Dialen. The test plots, made up of moderately loamy leached chernozem, contained numerous dicotyledons, bristle weed and barnyard millet. Methods of cultivation and herbicide use was shown to have a key effect on both weed content and technical quality of the wheat. Bayalan, Diameth-D and 2,4-D generally improved grain quality, particularly where little soil preparation was used; 2,4-D had the best effect. Increased protein and gluten content was attributed to a reduction in carbohydrates in the test wheat. In the rotation, weed mass gradually increased as numerous species became resistant to 2,4-D. 2,4-D and Diameth-D in combination with minimal soil preparation had little impact on weed mass as the weeds developed resistance to them. In these cases Bayalan was more effective. Figure 1.
[258-12131]

UDC 632.954:633.15

EFFECTIVENESS OF HERBICIDES ON CORN PLANTINGS IN SOUTHERN KAZAKHSTAN

Moscow KHIMIYA V SEL'SKOM KHOZYAYSTVE in Russian No 5, May 82 pp 41-42

PAK, K. I., candidate of agricultural sciences, Agricultural Test Station, Chimkent

[Abstract] Weed infestations limit the success of planned corn yield in southern Kazakhstan, partly because the region's soils contain 200-250 million weed seeds per hectare, along with 1-2 tons of plant organs and 5-10 million buds. Agelon, Gesaprim and preparation A-3620 were tested in 1977-1979 both in pure form and mixed with NP-fertilizers. The long-irrigated serozem of the test plot was analyzed, then herbicides sprayed on in pure form or distributed with NP-fertilizer. A hybrid of Kazakhstanskiy 43TV was planted; during the growing period the field was cultivated twice, fertilized twice with $N_{60}P_{160}$, and irrigated 5 times. Results showed that the herbicides killed 86.6 to 93.5% of the weeds and increased yields 5.9-8.1 centner/ha. No significant residues of the herbicides were found in the soil by late July or in the corn plants beyond the first stage of the growing period.
[258-12131]

UDC 631.811.98:633.11

USING TUR(CHLOROCHOLINCHLORIDE) GROWTH RETARDANT TO INCREASE WINTER WHEAT PRODUCTIVITY UNDER IRRIGATION

Moscow KHIMIYA V SEL'SKOM KHOZYAYSTVE in Russian No 5, May 82 pp 42-45

PIKUSH, G. R., doctor of agricultural sciences, and SAKHAROV, V. D., candidate of agricultural sciences, All-Union Scientific Research Institute for Corn

[Abstract] The Institute's method for preplanting treatment of seeds with the title retardant has gained wide acceptance in recent years. It acts by promoting

deep growth of the tiller, bringing better wintering and increased drought resistance and productivity. Combating beating down has led to applying the same compound in spring, but under irrigation, where large stalks grow, this is insufficient. The authors combined these methods at the Institute's test station in Dnepropetrovsk Oblast on southern chernozem with little humus and deep ground water, using a 10% solution on seeds, spraying the plantings at 2 and 4 kg/ha, and spraying again in spring. The wheats were Dneprovskaya 775, which resists beating down, and Odesskaya 51, which does not. Temperature and moisture conditions varied, but soil moisture was kept at 70-75% saturation. In all years, better yield increases were achieved with Odesskaya 51, but improvement was recorded in both varieties in all growing periods but 1979, when fall growing conditions were poor. As the increased yields led to low protein and gluten content because of nitrogen shortages, urea was applied to correct that problem. With this correction, the application of the growth retardant in both fall and spring was found to improve resistance to beating down and maintain grain quality while sharply increasing yields. Figure 1. [258-12131]

UDC 547.832.632.95

PESTICIDAL AND GROWTH-REGULATING ACTIVITY OF 1-METHYL-3-ARYLBENZO[f]QUINOLINE-2-CARBOXYLIC ACID ETHYL ESTERS AND THEIR QUATERNARY SALTS

Minsk VESTSI AKADEMII NAVUK SSSR: SERYYA KHIMICHNYKH NAVUK in Russian No 3, May-Jun 82 (manuscript received 22 Dec 81) pp 61-64

KOZLOV, N..S., SAUTS, R. D., ROZHKOVA, N. G., SERZHANINA, V. A. and ANDREYEVA, Ye. I., Institute of Physical and Organic Chemistry, Belorussian Academy of Sciences; and All-Union Scientific Research Institute of Chemical Substances for Plant Protection, Moscow

[Abstract] Results are presented from screening of benzo[f]quinoline series esters (I) and their quaternary salts (II) for pesticidal (insectoacaricidal and fungicidal) and growth-regulating activity. Compounds I and II were tested as contact insecticides and acaricides. The fungicidal activity was studied under laboratory conditions by injection into pure fungus cultures and under greenhouse conditions. Primary screening of the growth regulator properties of the compounds was performed on a tobacco cell culture. The studies showed that this group of compounds may be of interest for pesticidal and growth-regulation purposes. References 11: 10 Russian, 2 Western.
[282-6508]

UDC 547.491.8.07(088.8)

SYNTHESIS OF BENZIMIDAZOLYL-sim-TRIAZENES

Yerevan ARMYANSKIY KHIMICHESKIY ZHURNAL in Russian Vol 35, No 5, May 82 (manuscript received 25 Mar 81) pp 339-341

DOVLATYAN, V. V., GYUL'BUDAGYAN, L. L. and AMBARTSUMYAN, E. N., Armenian Agricultural Institute

[Abstract] N-alkylcyanamino-sim-triazenes do not react with phenylenediamine and hydrochloride. Therefore, the compounds in the title were synthesized through the hydrochlorides of N-substituted triazinyl-0-alkylisoureas by heating with phenylenediamine in chloroform for a long period of time. Benzimidazol derivatives are of interest as pesticides. References 3: 2 Russian, 1 Western.
[280-6508]

UDC 547.551.42:547.314

SYNTHESIS AND SEARCH FOR POTENTIAL PESTICIDES BASED ON ACYLATION OF AMINOALCOHOLS

Tashkent UZBEKSKIY KHIMICHESKIY ZHURNAL in Russian No 2, Mar-Apr 82 (manuscript received 9 Jan 81) pp 34-38

ELMURADOV, B., MAKSUDOV, N. Kh. and SHAZHENOV, A. A., Tashkent Order of Labor's Red Banner Institute of Agricultural Irrigation and Mechanization Engineers

[Abstract] The reaction of certain aminoalcohols with aliphatic and aromatic acid chlorides and anhydrides as well as the acids themselves was studied. The initial aminoalcohols used were N,N-bis-β-oxyethylanaline (I), N,N-bis-β-oxyethyl-o-chloroanaline (II), N,N-bis-β-oxy-o-anisidene (III), N,N-bis-β-oxyethyl-o-bromoanaline (IV), and N,N-bis-β-oxyethyl-m-toluidine (V). The acylating agents used were acetic anhydride, acetyl, propionyl, butyryl, chloroacetyl, palmityl, steroyl, benzoyl and o-methoxybenzoyl chlorides, formic, acetic, chloroacetic, propionic and butyric acids. Tables of physical and chemical constants of the N,N-bis- alkoxy(aroyloxy)ethylarylamines are presented. References 5 Russian.
[2[illegible]6-6508]

UDC 632.95:547.466

AMINO ACIDS AND THEIR DERIVATIVES AS HERBICIDES AND PLANT GROWTH REGULATORS

Alma-Ata IZVESTIYA AKADEMII NAUK KAZAKHSKOY SSR: SERIYA KHIMICHESKAYA
in Russian No 3, May-Jun 82 (manuscript received 30 Dec 80) pp 84-87

TUMANOVA, Ye. V., SENCHEVSKAYA, V. A. and DZHILKIBAYEVA, G. M., Institute of Chemical Sciences, KaSSR Academy of Sciences, Alma-Ata

[Abstract] Among amino acids with herbicidal and plant growth regulating action, "Suffix" and "Karachol," based on ethyl-N-benzoyl-N(3,4-dichlorophenyl)-2-aminopropionate, are currently approved for Soviet use. Trials for experimental and industrial use are under way for "Amiben" and "Tordon 22K," based respectively on 2,5-dichloro-3-aminobenzoic and 3,5,6-trichloropicolinic acids. The authors review work on use of amino acids as herbicides and growth regulators as seen in patents granted in the USSR, Bulgaria, Great Britain, The United States, France and Japan. Amino acids so used are aliphatic, aromatic, hetercyclic acids and their derivatives. The most-frequently patented are alpha-aminocarboxylic acids of the L-series; they are generally water-soluble salts of ammonium, alkali and alkaline-earth metals. Higher alkyl esters are shown to be less toxic for man and animals than derivatives of carbamates, diphenyl esters, symm-triazine or urea. Phenylalanines derivatives are active and are frequently combined with inert substances or with triazines, methyldioxybenzene or phenoxyalcanes. Methyl, ethyl or isopropyl esters of N-benzoyl-(3,4-dihalophenyl)-alanine were more selective herbicides and growth regulators in grain crops that the corresponding acids. Various amino benzoic acids and their derivatives, and heterocyclic amino acids containing a pyriridne ring have also received attention. Japanese firms have been particularly interested in carbomoyl derivatives. References 14: 2 Russian, 12 Western.
[270-12131]

PHARMACOLOGY AND TOXICOLOGY

UDC 615.254.1:547.828].015

NEW INHIBITORS OF XANTHINOXIDASE FROM CLASSES OF PYRAZOLO[3,4-d]PYRIMIDINES AND PYRAZOLO[3,4-b]PYRIDINES, REPORT 2: COMPARATIVE EVALUATION OF EFFECTIVENESS

Moscow KHIMIKO-FARMATSEVTICHESKIY ZHURNAL in Russian Vol 16, No 6, Jun 82 (manuscript received 3 Nov 81) pp 655-660

BARTANYAN, L. S., RASHBA, Yu. E., KOZACHENKO, A. I., KORBUKH, I. A., BULYCHEV, Yu. N. and PREOBRAZHENSKAYA, M. N., Institute of Chemical Physics, USSR Academy of Sciences; All-Union Scientific Oncological Center, USSR Academy of Medical Sciences, Moscow

[Abstract] A previous report suggested the mechanism of inhibiting xanthinoxidase; in the present study the authors present results of their consideration of the inhibiting activity of the title compounds, which are analogs of allopurinol. Enzyme action was measured without preliminary incubation as the decrease in initial rate of fermentation. As with allopurinol and the recent example of alloxanthine, formation of a stable complex was preceded by formation of a rapidly reversing complex. Comparison of inhibitor concentrations and the constant of dissociation of rapidly formed xanthinoxidase complexes with the inhibitor show that only 1,5-substituted 4-hydroxy-pyrazolopyrimidines were close in activity to allopurinol; all others were weaker inhibitors. For some of the many complexes tested, introduction af a carboxyl group at position 5 increased inhibiting activity greatly, by more than a factor of 10. Results suggested good prospects for active, practically irreversible inhibitors among pyrazolo-pyrimidines substituted at positions 4 and 6 with hydroxy-, mercapto- or methylmercapto-groups and with hydrophobic or nucleophile substituents in positions 1 or 5. These complexes could be used in medicine and as ligands in affine chromatography of xanthinoxidase. Figure 1; references 15: 8 Russian, 7 Western.
[269-12131]

UDC 615.332.547.567].012.1

BIOLOGICALLY ACTIVE HETEROCYCLIC QUINONES (REVIEW)

Moscow KHIMIKO-FARMATSEVTICHESKIY ZHURNAL in Russian Vol 16, No 6, Jun 82
(manuscript received 3 Nov 81) pp 667-678

TSIZIN, Yu. A. and CHERNYAK, S. A., Institute of Medical Parasitology and Tropical Medicine imeni Ye. I. Martsinovskiy, Moscow

[Abstract] Interest in the title quinones, which began 15-20 years ago, has been directed at the high biological activity of certain natural compounds in the group, but compounds with valuable chemical therapeutic properties have also been discovered among synthetic heterocyclic quinones. The authors review and systematize research up to the present. They discuss nitrogen- and oxygen-containing types, the former of which include mitomycetin antibiotics produced by streptomycetes S. caespitosus, S. verticillatus and S. ardus, discovered by Japanese researchers. Mitomycines contain 3 centers that are connected with tumor control: a carbamoyl group, an aziridine ring and a methoxy(amino) quinone system. Simpler and less toxic analogs are being sought. Antibiotic properties seem to be related to low lipophilicity and rather low redox potential. Streptonigrines produced by S. flocculus, S. albus and S. lavendulae also control tumors, by inhibiting DNA synthesis through causing isolated chain breaks. Isoquinoline quinones produced by S. lavendulae affect certain tuberculosis mycobacteria. Kinamycines produced by S. muraymaensis affect Gram-positive bacteria by cross-linking DNA. Anthraquinone heterocyclic analogs and tyrosine melanines that provide pigmentation for all sorts of organisms are also mentioned among nitrogen-containing natural types. Oxygen-containing types include representatives of the genus Streptomyces with an isochromanquinone fragment, which have antibiotic activity because of bis-alkylating agents, and others. The review ends with advances in synthesis, noting that, typically, these compounds have donor substituents in the quinone ring. References 109: 8 Russian, 101 Western.
[269-12131]

UDC 615.281.8:547.473.2].012

STUDY OF UNSATURATED LACTONES, REPORT 73: SYNTHESIS AND ANTIVIRAL ACTIVITY OF CERTAIN SUBSTITUTED 2-BUTENE-4-OLIDES

Moscow KHIMIKO-FARMATSEVTICHESKIY ZHURNAL in Russian Vol 16, No 6, Jun 82
(manuscript received 26 Jun 81) pp 679-682

AVETISYAN, A. A., DZHANDZHAPANYAN, A. N., NAZARYAN, R. G., VOTYAKOV, V. I., KHLYUSTOV, G. V., VLADYKO, G. V., KLIMOVICH, V. Ya., KOROBCHENKO, L. V., SHASHIKHINA, M. N. and ZHAVRID, S. V., Yerevan University; Belorussian Scientific Research Institute of Epidemiology and Microbiology, Minsk

[Abstract] Both natural and synthetic compounds with a lactone ring are known to have biological activities of many types. The authors produced new

2-butene-4-olides by chemical reduction of 2-acyl derivatives and studied their activity. The initial substituted 2-acetyl-2-butene-4-olides and the chloroanhydride of 2-carboxy-3,4,4-trimethyl-2-butene-4-olide were identified and confirmed with spectral analysis and thin layer chromatography. Chemical details are given in the experimental chemistry section. Effects were studied on various flu viruses, Venezuelan equine encephalomyelitis, adenovirus, Herpes simplex and other viruses and vaccines. Results showed that most of the compounds studied were inactive in relation to the test viruses. A 2-(1'-iminoethyl)-3,4,4-trimethyl-2-butene-4-olide showed weak activity toward Venezuelan equine encephalomyelitis, and the hydrochloride of thiosemicarbazide of 2-carboxy-3,4,4-trimethyl-2-butene-4-olide had a weak inhibiting effect for flu virus and antiviral action for Herpes simplex. References 20: 10 10 Russian, 10 Western.
[269-12131]

UDC 615.276+615.212]:547.775].012.1

SYNTHESIS AND BIOLOGICAL ACTIVITY OF PYRROLYL-SUBSTITUTED PYRAZOLONES-5

Moscow KHIMIKO-FARMATSEVTICHESKIY ZHURNAL in Russian Vol 16, No 6, Jun 82 (manuscript received 2 Jul 81) pp 687-692

ZHESTKOV, V. P., VORONIN, V. G., SUSLINA, M. L. and ZAKS, A. S., Moscow Oblast Branch, All-Union Scientific Research Chemical-Pharmaceutical Institute imeni S. Ordzhonikidze; Perm Medical Institute

[Abstract] The authors synthesized a number of compounds of the title type and studied their antiphlogistic, analgesic and antipyretic activity. Best results were obtained using 5-10% excess sodium ethylate to produce ketoesters by alkylation of 2,4-dimethyl-3-carboethoxy-acetyl-5-carboethoxypyrrole. The structure of this and other pyrrolyl-beta-ketoesters was confirmed by mass-spectrometry, as were those of the remaining pyrrolyl-substituted pyrazolones-5 in the test. Acute toxicity, antiphlogistic and analgesic activity were determined in mice and rats. 4-Alkyl-3-(2,4-dimethyl-5-carboethoxypyrrolyl-3)-pyrazolones-5 at first caused heightened motor activity, but in 20-30 minutes that was followed by ptosis, central nervous system depression and eventual death by the end of the first day. The other compounds had no such effects, but brought hypothermal and antiphlogistic results depending on their particular structures. They were less toxic than the control, amidopyrine. References 10: 3 Russian, 7 Western.
[269-12131]

UDC 615.381.8:546.27].012.1

ANTIVIRAL ACTIVITY OF BORON CHELATES SYNTHESIZED FROM 2-AMINOPYRIDINE

Moscow KHIMIKO-FARMATSEVTICHESKIY ZHURNAL in Russian Vol 16, No 6, Jun 82
(manuscript received 14 Dec 81) pp 695-699

LAGUTKIN, N. A., MITIN, N. I., ZUBAIROV, M. M., DOROKHOV, V. A. and MIKHAYLOV, B. M., All-Union Scientific Research Institute of Veterinary Virology and Microbiology, USSR Ministry of Agriculture, Vladimirskaya Oblast; Institute of Organic Chemistry imeni N. D. Zelinskiy, USSR Academy of Sciences, Moscow

[Abstract] The authors studied a number of coordinate boron compounds that had heightened chemical stability. The title chelates and derivatives have a tetra-coordinated boron atom in a six-membered ring condensed with a pyridine ring. The experimental chemistry section gives chemical details. All chelates were studied in vitro, in ovo and in vivo for antiviral activity in fibroblast cell cultures of large embryos, in 1-day chicken embryos, and in 70-80-day-old chicks. Results showed that the title chelates and complexes of 1-boraadamantane had similar inhibiting action for Aujeszky's disease and large fibroblast embryos. The chelates had a somewhat better protective effect for chicken embryos infected with Newcastle's disease, while 1-boraadamantane derivatives were more effective for poultry flu virus. References 9 (Russian).
[269-12131]

UDC 615.31:547.288.15'173'113.1

HYDRATED HEXAMETHYLENE TETRAMINE COMPLEX OF COBALT CHLORIDE, A BIOACTIVE COMPOUND

Frunze IZVESTIYA AKADEMII NAUK KIRGIZSKOY SSR in Russian No 2, Mar-Apr 82
(manuscript received 24 Dec 81) pp 37-39

SABIROVA-NIKITINA, T. S., AKTANOVA, S. T., NANAYEVA, M. T. and IMANAKUNOV, B. I., Institute of Inorganic and Physical Chemistry, KiSSR Academy of Sciences; Kirghiz State Medical Institute

[Abstract] Inorganic salts with the title amine, which form by simple mixing, have long been used in medicine, but literature reports about them are con tradictory. The authors studied the reaction of cobalt chloride with HMTA and obtained the new compounds $3CoCl_2 \cdot 2(CH_2)_6 \cdot 6H_2O$ and $CoCl_2 \cdot 2(CH_2)_6N_4 \cdot 10H_2O$. The latter was studied by physical-chemical analysis, thermal durability test and infrared spectral analysis. Toxic and hematopoietic comparisons showed it to be less toxic than commonly used coamide; it had a generally beneficial effect on test rabbits and rats, inducing weight gain and increased hemoglobin and erythrocytes in peripheral blood, with no pyrogenic effect. At 2 mg/kg of body weight it had a more pronounced hematopoietic effect, and this increased markedly at 5 mg/kg. Its high biological activity is apparently related to

its structure, with its Co^{2+} cation being fully insulated by coordination and by hydrogen-bonding water molecules. References 4: 3 Russian, 1 German.
[360-12131]

UDC 547.853.7

ADVANCES IN CHEMISTRY OF HYDRAZINOPYRIMIDINES (REVIEW)

Riga KHIMIYA GETEROTSIKLICHESKIKH SOYEDINENIY in Russian No 5, May 82
(manuscript received 21 Sep 80) pp 579-600

IVASHCHENKO, A. V. and GARICHEVA, O. N., Scientific Research Institute for Organic Intermediates and Dyes, Moscow

[Abstract] The title compounds, their derivatives and heterocyclic systems based on them have anti-inflammatory, fever reducing, bactericidal and fungicidal actions; they also stimulate the central nervous system, act as sedatives and blocking agents, reduce blood pressure, inhibit DNA polymerase, etc. The authors review procedures for obtaining them by reactions of hydrazines with halogen pyrimidines, thio- and alkylthiopyrimidines, alkoxypyrimidines, (methylsulfonyl)-pyrimidines and derivatives of pyrimidine-sulfonic acids, 2-nitroaminopyrimidines, aminopyrimidines and trimethylpyrimidinyl-ammonium salts, and other reactions. Chemical reactions of hydrazinopyrimidines include the action of water, acids and bases, reduction and oxidation synthesis of derivatives and of heterocyclic systems containing a pyrimidine ring. The latter section of the review is sub-divided into ten specific types of compounds. References 260: 48 Russian, 212 Western.
[262-12131]

UDC 636.089

RESULTS OF STUDYING EMBRYOTOXIC AND TERATOGENIC ACTION OF HEXICHOL

Moscow KHIMIYA V SEL'SKOM KHOZYAYSTVE in Russian No 5, May 82 pp 49-51

KHRUSTALEVA, L. I., LAPTEVA, L. A. and VESELOVA, T. P., doctor of veterinary sciences, All-Union Institute of Helminthology imeni K. I. Skryabin

[Abstract] Hexichol, the medicinal form of hexachloroparaxylol, is widely used in the USSR to control parasitic worms in fasciolysis and dicroceliosis of livestock. The need for further study of embryotoxic and teratogenic effects led the authors to the present study. In it, 104 test and 61 control female rats were mated, and the test animals given 900 mg/kg of hexichol 3 times in the first 17 days of pregnancy. On the 20th day, they were killed and the number of live, dead and resorbed offspring counted and measured. Then offspring were divided into two groups, one of which was studied for the

condition of internal organs using the Wilson method, and the other studied for skeletal development using the Dawson method. Pre-implant zygote death and post-implant embryo death was calculated and a standard error of measurement for test and control groups established. There were no significant differences in skeletal development or in internal organs. References 3 (Russian). [258-12131]

POLYMERS AND POLYMERIZATION

UDC 541.64:547.86

POLYMERIZATION OF 10-VINYLPHENTHIAZINE IN PRESENCE OF ORGANIC pi-ACIDS

Moscow VYSOKOMOLEKULYARNYYE SOYEDINENIYA in Russian Vol 24, No 6, Jun 82
(manuscript received 11 Nov 80) pp 1135-1138

GORSHKOV, A. G., TURCHANINOV, V. K., SVYATKINA, L. I., KUROV, G. N. and
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USSR Academy of Sciences

[Abstract] The authors had earlier shown that products of chemical reactions of acceptor electrons with the monomer initiated the title polymerization. Here, they used anthraquinone, p-toluquinone, p-benzoquinone, 2,4,7-trinitrofluorenone and 7,7,8,8-tetracyanoquinodimethane acceptors, conducting the polymerization in evacuated ampules during freezing. The two fractions of poly-10-vinylphenthiazine were separated, then analyzed by electron spectroscopy. It appeared that the initial reaction rates increased as the energy of charge transfer decreased and acceptor electron numbers grew. Electron spin resonance methods showed that introduction of a cation inhibitor into the reactive mass almost completely suppressed polymerization. The dualism of the cation-radical chemical properties suggest polymerization of the monomer by both cation and radical mechanisms, but the lack of a styrene copolymer with the title thiazine and/or its homopolymer during polymerization with 7,7,8,8-tetracyanoquinodimethane point to the effective suppression of the radical function. The existence of free ions suggests a balance between macrocations and their ion pairs with the anion-radicals during initiation and chain growth. Addition of the radical salt K^+TCQD^- led to a shift in balance in the direction of the ion pair, reducing yield of the R_t fraction and increasing oligomer R_p fractions in the final product. Initiating polymerization includes a stage when donor-acceptor complexes are formed, followed by ionogenic dissociation and recombination of the cation-radical monomer into a dication. The nature of the acceptor used and the mobile ion pair macrocation balance determine molecule mass of the polymer products. Figures 2; references 17: 9 Russian, 8 Western.
[264-12131]

UDC 541.64:547.341

SYNTHESIS, STRUCTURE AND PROPERTIES OF POLYMERS OF 3,4-DICHLORO-1,3-BUTADIENE-2-PHOSPHONATES

Moscow VYSOKOMOLEKULYARNYYE SOYEDINENIYA in Russian Vol 24, No 6, Jun 82
(manuscript received 11 Feb 81) pp 1252-1257

LYKOV, A. D., MASHLYAKOVSKIY, L. N., REPKIN, V. Yu. and OKHRIMENKO, I. S.,
Leningrad Technological Institute imeni Lensovet

[Abstract] In radical polymerization, 1,3-alkadiene-1-phosphonates form high-molecular hard homopolymers that are more like plastics than elastomers. It is natural to expect significant changes in microstructure and properties when phosphonoprenes are used as the initial monomers. The authors present results of the title phosphonates reaction with radicals of CH_3, C_2H_5, C_3H_7, iso-C_3H_7, C_4H_9, and C_6H_5. Polymerization was conducted in sealed ampules in argon or air at about 70°C, with "DAK" [expansion unknown] as initiator. The title compound was very reactive; with increasing depth of polymerization, the growth of polymers of the title compound pointed to formation of branched polymers as allyl atoms of chlorine and hydrogen were transfered to the chain. The type of combination of monomer chains was clarified by ^1H and ^{31}P NMR and infrared spectroscopy. Results showed the formation of polymers of more regular structure than in polymerization of 1,3-alkadiene-1-phosphonates, which contain only 1,4-links of trans-configuration. After reprecipitation and vacuum drying, the poly-DBP compounds were solid durable plastics or rubber-like polymers, which were readily soluble in chlorinated and aromatic hydrocarbons and other solvents. They were stable when heated in air at 150-200°, but lost 10% of their mass at 220-240°C due to dehydrochlorination. At temperatures of the order of 300° the rate of decomposition slows sharply. They do not burn in flame but decompose to a carbon residue. Figures 4; references 13 (Russian).
[264-12131]

UDC 678.664.546.268.2

CONDITIONS OF FORMATION OF FURANE OLIGOAMIDOURETHANE FROM HEXAMETHYLENE DIISOCYANATE

Tashkent UZBEKSKIY KHIMICHESKIY ZHURNAL in Russian No 2, Mar-Apr 82
(manuscript received 1 Oct 81) pp 24-26

KUCHKAROVA, L. Kh., MAGRUPOV, F. A. and ABDURASHIDOV, T. R., Tashkent Order of
Friendship of Peoples Polytechnical Institute imeni Abu Raykhana Beruni

[Abstract] Some of the conditions of formation of furane oligoamidourethane (FOAU) from hexamethylene diisocyanate and furfuryl alcohol are studied, as well as the properties of coatings made from FOAU. The initial reagents were purified by double vacuum distillation and synthesis was performed in a mass and in a solution of cyclohexanone. It was found that triethylamine has an

effective catalytic influence when present at 0.5% or higher. Though the reaction rate of the initial reagents is much slower in solution than in a mass, after the content of NCO groups in the mass reaches 9 to 11% it becomes so thick that agitation becomes impossible. Increasing the temperature of synthesis accelerates the reaction, and formation of FOAU is completed within 6 hours at 428 K. The coatings produced become harder while retaining good elasticity and impact resistance when the temperature at which coatings are treated is increased from 473 to 573 K. Figures 2; references 5 (Russian).
[286-6508]

UDC 541.64:542.952

SYNTHESIS OF GRAFT COPOLYMERS OF CELLULOSE TRIACETATE-POLYMETHYLMETHACRYLATE BY CONTINUOUS RADICAL POLYMERIZATION IN PRESENCE OF COMPLEX FORMERS

Tashkent UZBEKSKIY KHIMICHESKIY ZHURNAL in Russian No 2, Mar-Apr 82 (manuscript received 5 May 81) pp 31-33

AKBAROV, Kh. I., OLENIN, A. V., TASHMUKHAMEDOV, S. A. and ZUBOV, V. P., Tashkent State University imeni V. I. Lenin; Moscow State University imeni M. V. Lomonosov

[Abstract] Graft polymerization in the presence of complex formers is interesting for controlled synthesis of graft polymers. The authors studied the kinetics of post-radiation graft polymerization of methylmethacrylate in the presence of H_3PO_4 on γ-irradiated cellulose triacetate film 40-50 μm thick containing 59.2% bonded acetic acid. Gamma rays from a cobalt 60 source were used to bombard the films in a vacuum at 107 rad/sec and 196°C. Graft polymerization was performed in a vaccum at 20°C by introduction to the reaction system of a molar ratio of H_3PO_4:MMA=0.3:1.0. The modified films were then extracted with benzene in a Soxhlet apparatus for 30 hours to remove the PMMA formed as a side product, then vacuum-dried to constant mass. The composition was determined gravimetrically. The reaction mechanism was found to be complicated by the specifics of diffusion of the reaction mixture in the cellulose triacetate, but allows controlled synthesis while monitoring the degree of grafting, molecular mass and number of graft chains. Figures 2; references 3: 2 Russian, 1 Western.
[286-6508]

RUBBER AND ELASTOMERS

UDC 678.762.2-134.532.134.433.043.4.8:54

PREVENTING PREMATURE VULCANIZATION OF RESIN MIXTURES BASED ON CARBOXYLATED BUTADIENE-NITRILE RUBBER

Moscow KAUCHUK I REZINA in Russian No 6, Jun 82 (manuscript received 26 Dec 80) pp 22-24

GUSEV, Yu, K., ROMANOVA, A. B., FILINOV, G. P. and YAKOVENKO, E. I., Voronezh Branch, All-Union Scientific Research Institute for Synthetic Rubber imeni S. V. Lebedev

[Abstract] Premature vulcanization hinders broad use of the title elastomers. Study is reported of the effects and properties of the products of these resins when magnesium and zinc oxides, and master blends of rubber with oxides and peroxides of bivalent metals, were used. Zinc and magnesium peroxides provided great resistance to scorching, but they partially decomposed and threatened to cause fire in the preparation process. Various adjustments in metal content and in the process did not solve these disadvantages. Vulcanisates were produced by using combined vulcanizing agents which were composed of a master batch (containing zinc oxide and peroxide, SKN-26 and SKN-40) prepared at the latex stage, and tetramethylthiuram disulfide. Figure 1; references 4: 2 Russian, 2 English.
[265-12131]

UDC 678.021.17:678.04

EFFECT OF MIXING PROCEDURE ON PROPERTIES OF MIXES MODIFIED BY p-NITROSODIPHENYLAMINE

Moscow KAUCHUK I REZINA in Russian No 6, Jun 82 (manuscript received 23 Apr 81) pp 24-26

SHVARTS, A. G. and KNYAZEVA, L. A., All-Union Scientific Research Institute for Tire Production

[Abstract] Combinations of rubbers used in making tires can have varying qualities depending on preparation procedures. The title amine is an effective modifier for synthetic *cis*-polyisoprene. The authors studied its role when

added at the mixing stage in mixes of stereo-regular rubbers aimed at optimal technological and wearing properties, with a 70:30 mix of SKI-3 and SKD, filled with PM-100 carbon and without stabilizers. By varying the mixing order, they obtained different plasticity, hardness, viscosity and swelling values. When the title amine and PM-100 were added at the same time, apparently part of the modifier was adsorbed on the carbon, thereby reducing the number of durable bonds between the elastomer and the filler. The tests indicated that the best properties were obtained when p-nitrosodiphenylamine and zinc oxide were added simultaneously in the second stage of mixing. References 13: 10 Russian, 3 English.
[265-12131]

UDC 541.64:546.215:547.315.3

STUDY OF OLIGOMERIZATION OF ISOPRENE WITH HYDROGEN PEROXIDE INITIATION

Moscow VYSOKOMOLEKULYARNYYE SOYEDINENIYA in Russian Vol 24, No 6, Jun 82
(manuscript received 1 Dec 80) pp 1168-1173

VALUYEV, V. I., DMITRIYEVA, T. S., SHLYAKHTER, R. A., YATSIMIRSKAYA, T. S., BOYKO, V. P. and GRISHCHENKO, V. K., Institute of High-Molecular Compound Chemistry, UkSSR Academy of Sciences; All-Union Scientific Research Institute for Synthetic Rubber imeni S. V. Lebedev

[Abstract] Radical polymerization of diene monomers initiated by hydrogen peroxide is a simple manner for obtaining oligomers containing hydroxyl-groups for making frost-resistant, hydrolytically-stable polyurethanes. The authors tested methyl, ethyl, propyl and carbon-labeled radioactive isopropyl alcohols, with monomer:initiator ratios of 3:1. Average molecular mass of the oligomers formed was determined by ebullioscopy or by measuring the heat effects of condensation with toluene as the solvent. Molecular mass difference was determined by gel chromatography. The distribution by functional types of samples synthesized in isopropyl alcohol showed that the quantity of monofunctional molecules (by primary OH-groups) was 40-45 molecular percent. Assay of the concentrations of isopropanol fragments of ^{14}C showed 81-87% bifunctional molecules in oligoisoprene. Under mild synthesizing conditions, use of isopropyl alcohol sharply reduced the portion of bifunctional molecules, with effective functionality falling below 2. Figures 3; references 18: 14 Russian, 4 Western.
[264-12131]

UDC 678.4(45+57)338.5

ATTEMPTED EFFECTIVE USE OF PRODUCTION POTENTIAL IN SYNTHETIC RUBBER INDUSTRY

Moscow ZHURNAL VSESOYUZNOGO KHIMICHESKOGO OBSHCHESTVA IM. D. I. MENDELEYEVA in Russian Vol 27, No 3, May-Jun 82 pp 261-266

SAZYKIN, V. V., chief, All-Union Industrial Association for Synthetic Rubber Production

[Abstract] The author reviews synthetic rubber development and production for tires and other uses, replacing and augmenting natural rubbers in both quantity and quality. Average annual growth has been at 9%, with isoprene, butadiene and various latexes growing by more than a third in the 10th Five-Year Plan. A significant advance has taken place in synthetic rubber production jointly with monomer products at nearly all Soviet rubber plants. Inhibitors to prevent thermal polymerization of monomers is isoprene and divinyl production have brought major savings. The example of the Nizhnekamsk Petrochemical Association is cited, where benzene for ethylene and heavy oil for a power plant are produced jointly. Catalytic improvements, to control butyl rubber polymerization, new catalysts for dehydrogenation to produce isoprene from isopeptane and other new procedures are summarized. Cis-isoprenes and cis-butadienes, and the new SKI-3-01 rubber being produced at the Togliatti Rubber Plant, are characterized by properties that exceed natural rubbers, such as cohesion, better resistance to deformation, improved elasticity and wear, and other features. Resins for abrasives, asbestos products and electronics are also discussed. Urethane elastomers for automobiles and tractor engine uses, and rubber shoe soles are being improved in durability and economy of production. The organization of Soviet synthetic rubber production, use of secondary energy sources, and conservation and re-use of rubber products are also discussed.
[279-12131]

UDC 615.31:547.926.5.04:579.8

TRANSFORMING SITOSTEROL WITH VARIOUS BACTERIA

Moscow KHIMIKO-FARMATSEVTICHESKIY ZHURNAL in Russian Vol 16, No 6, Jun 82
(manuscript received 12 Jan 81) pp 722-727

AMELINA, A. S., KOROBOVA, Yu. N., GRECHUSHKINA, N. N., GABINSKAYA, K. N.
and MESSINOVA, O. V., All-Union Scientific Research Chemical-Pharmaceutical
Institute imeni S. Ordzhonikidze, Moscow

[Abstract] Citing the need for low-cost and available materials for synthesizing steroid hormones, the authors studied bacteria that are capable of producing such compounds from sitosterol obtained from wood-industry waste. They found the best source in mycobacteria; 158 strains, of which 96 were domestic, were obtained from collections, and 62 strains were separated from soil. This layer chromatography was used to identify products of transformation. Various factors affected the results, such as, composition of the culture media, initial pH, aeration and mixing, temperature, inhibitors, additives, etc. Results showed that while many of the tested strains could cause breakdown of the sitosterol, only 29 were capable of gathering the products of transformation in the culture medium, and only 9 could form significant amounts of the complete products. Various transformation products were produced by Myc.flavum var methanicum B_2 and B_5, and Protoaminobacter alboflavum, Myc. mucosum 3-AP, 12-F, Myc. lacticola 114 and 117, Myc. perrugosum 850 and Myc. parafinicum 134. Figures 2, references 5: 1 Russian, 4 Western.
[269-12131]

UDC 634.0.813.2

VOLATILE SUBSTANCES OF BIOLOGICALLY ACTIVE PRODUCTS SEPARATED FROM FIR WOOD FOLIAGE

Riga KHIMIYA DREVESINY in Russian No 3, May-Jun 82 (manuscript received 2 Apr 82) pp 96-98

YAGODIN, V. I., KOKSHAROV, A. S., ANTONOV, V. I. and YAGODINA, M. A., Leningrad Academy of Forest Technology imeni S. M. Kirov; "EFIRMASLO" Scientific Production Association

[Abstract] Due to difficulties and low quantities in obtaining the title substances, little study has been devoted to them. The authors analyzed the composition of these substances from products from the Lisinskiy Educational and Experimental Forest Station, which processes Picea excelsa L with 58-62% needles. Products included, in mass percentages, 0.8-1.08% conifer chlorophyll-carotene paste, 0.33-0.38 sodium chlorophyllin, 0.7-0.8 raw chlorophyllin, 0.4-0.66 balsam paste, 0.08-0.10 provitamin concentrate, 0.4-0.91 conifer wax, and 0.04-0.06 conifer feed flour. Volatile substances consisted 40-70% of benzene and 30-60% of ether oil, with the latter containing 27 different components. Major among them were about 86% oxidized terpenes and sesquiterpenes (17.2%), in the chlorophyll-carotene paste, 27.6% bornyl acetate and terpineol alcohols with borneol (16.2%) in the provitamin concentrate, etc. Changes in the composition of the ethereal oils are basically from oxidation and losses of highly volatile components, changes in proportions of terpene hydrocarbons and oxidized terpene derivatives during the production of bioactive products. References 2 (Russian).
[263-12131]

UDC 547.458.81

LEAF POLYSACCHARIDES, PART I: DESCRIPTION OF CELLULOSE OF ANATOMICAL PARTS OF MULBERRY LEAF

Riga KHIMIYA DREVESINY in Russian No 3, May-Jun 82 (manuscript received 14 Jul)
pp 99-102

CHERNO, N. K., DYDKIN, M. S. and BELKINA, N. Ye., Odessa Technological Institute for the Food Industry imeni M. V. Lomonosov

[Abstract] With possible energy production in mind, the authors studied the cellulose of the veins and the leaf membrane of Morus alba from the Odessa area. Cellulose was separated with a 3% nitric acid solution; polysaccharides comprised 96 and 92% of veins and membranes, respectively. Paper chromatography was used to find glucose and xylene. Alcoholysis and X-ray structural analysis indicated a clear difference in the supermolecular structure of the two samples, with a mesomorphic fraction accounting for 3 times as much of the leaf membrane

cellulose as of the vein cellulose. The total of amorphic and mesomorphic fractions was 40% of the membrane, or twice as much as in the veins. Molecular distribution was studied by fractioning from solution in a sodium ferrotartrate complex, which showed that vein cellulose was of higher molecular structure, had more crystallinity and larger crystallites, while leaf membrane cellulose contained significant amounts of a loosely packed fraction, thus giving it greater reactivity. The functional roles of the separate types of tissue were related to these differences. Figures 2; references 5: 4 Russian, 1 German.
[263-12131]

UDC 547.791.3.2:914.3

OLEORESIN TERPENOIDS OF PICEA ORIENTALIS AND ABIES NORDMANNIANA GROWN IN CAUCASUS

Tashkent KHIMIYA PRIRODNYKH SOYEDINENIY in Russian No 2, Mar-Apr 82
(manuscript received 8 Jun 81) pp 189-194

SHMIDT, E. N., KHAN, V. A., ISAYEVA, Z. A., DREBUSHCHAK, T. D., DUBOVENKO, Zh. V., KEMERTELIDZE, E. P. and PENTEGOVA, V. A., Institute of Organic Chemistry, Siberian Branch, USSR Academy of Sciences, Novosibirsk; and Institute of Pharmaceutical Chemistry imeni I. G. Kutateladze, GSSR Academy of Sciences, Tbilisi

[Abstract] Chemical studies, up to the present, of oleoresins of firs have not included those in southern parts of the USSR. The authors studied the title trees to determine if the distinctive resins of Morinda and Casicta varieties were also to be found in Omorica firs. Specimens were taken from the Borzhomi ravine in 1979. Mono-, di- and sesquiterpene compounds were studied by gel-liquid chromatography and PMR. While monoterpene hydrocarbons found were similar to those of other firs, the sesquiterpenes differed sharply. Longifolene, alpha-longipinene and longicyclene were absent, as were cadinene and murolenes of Far-Eastern firs, but products of I,II-cyclization of trans-trans-farnesylpyrophosphate of caryophyllene and alpha-humulene were abundant. In all, 32 terpene compounds were identified in Picea orientalis, and 37 in Abies nordmanniana including 3 new sesquiterpene hydrocarbons. Other than typical diterpenoids for all firs, the latter tree contained methyldehydroabietate and 15-hydroxymethyldehydroabietate. Chemical procedures are presented in the experimental section. References 16: 14 Russian, 2 English.
[27 -12131]

UDC 547.787.2'722.07:543.426

SYNTHESIS AND SPECTRAL LUMINESCENT PROPERTIES OF HETARYL ETHYLENE DERIVATIVES OF 2,5-DIPHENYLOXAZOLE AND 2,5-DIPHENYLOXADIAZOLE-1,3,4

Riga KHIMIYA GETEROTSIKLICHESKIKH SOYEDINENIY in Russian No 4, May 82 (manuscript received 23 Sep 81) pp 617-621

KRASOVITSKIY, B. M., YEGOROVA, N. P., AFANASIADI, L. Sh., LYSOVA, I. V., POLYAKOV, V. K. and TSUKERMAN, S. V., All-Union Scientific Research Institute for Monocrystals, Scintillation Materials and Especially Pure Chemical Substances, Khar'kov; Kharkov State University imeni A. M. Gor'kiy, Khar'kov

[Abstract] The synthesis of organic luminophores of various structures in the title series indicated that it was possible to produce intensively-luminescent substances for many uses. The authors studied more complex types containing furan rings. These were obtained by RO-olefination, and their structures were determined by infrared spectral analysis. Study of fluorescence of isomer compounds showed that the position of the phenyl radical of the chlorine atom had practically no effect on the nature of the fluorescent band or the quantum yield. A hypsophloric effect accompanied by reduced intensity of fluorescence was noted in comparing isomer ortho- and para-bromosubstituted compounds. The highest scintillation effectiveness (114%) was obtained using alpha-methyl naphthalene. The compounds can be used as spectral shifters in obtaining liquid scintillators with longer-wave fluorescence than ROROR -- 1,4-di-2-(5-phenyloxazolyl-2)-4[5-(4-chlorophenyl)oxazolyl-2]benzene. References 9: 8 Russian, 1 English.
[262-12131]

UDC 66.064:66.063.2

SEMIPERMEABLE POLYMER MEMBRANE FOR SEPARATION OF $CHCl_3$-CCl_4 MIXTURES

Moscow VESTNIK MOSKOVSKOGO UNIVERSITETA, SERIYA 2: KHIMIYA in Russian
Vol 23, No 3, May-Jun 82 (manuscript received 6 May 81) pp 220-223

AGEYEV, Ye. P. and STRUSOVSKAYA, N. L., Department of Physical Chemistry

[Abstract] To achieve semipermeable properties for separation of a liquid mixture by evaporation through a membrane it is not sufficient that there be a great difference in the permeabilities for the individual substances. The presence of fluids of low polarity increases the permeability for the less compatible fluid since the diffusion coefficients depend on the degree of swelling and the joint plasticizing effect of the fluid facilitates mobility of macromolecular segments. Artificial aging by bombardment with α particles at 33 MeV was tested to improve selectivity of PTP membranes. It was found that artificial aging by irradiation reduced the permeability of the membranes but did not change the selectivity, which was independent of both membrane area and irradiation. Figures 4; references 6: 5 Russian, 1 Western.
[281-6508]

UDC 771.5+547.458.8

USE OF CELLULOSE Fe CATIONITES TO PRODUCE PHOTOGRAPHIC IMAGE

Minsk VESTSI AKADEMII NAVUK BSSR: SERYYA KHIMICHNYKH NAVUK in Russian
No 3, May-Jun 82 (manuscript received 27 Jul 81) pp 36-39

KOSHEVAR, V. D., YERMOLENKO, I. N., Institute of General and Inorganic Chemistry, Belorussian Academy of Sciences

[Abstract] The purpose of this work was to determine the most light-sensitive acid cellulose esters in the form of salts of iron, to be used to create a material for optical information recording. Characteristic curves as a function of the content of COOH groups and iron in the salt were recorded in order to determine the photographic parameters of the salts. The maximum was found to correspond to 1.8% COOH groups and $2 \cdot 10^{-3}$ g/g iron. Light-sensitive paper was developed in two stages, by immersion of the exposed specimen for 5 seconds into a 7% sodium hydroxide solution and development in a copper-formaldehyde developer. Figures 2; references 4: 3 Russian, 1 Western.
[282-6508]

UDC 541.14

INFLUENCE OF OXYGEN ON PHOTOCHEMICAL PROCESSES IN THIN LAYERS OF ACRIDINE SOLUTIONS

Moscow DOKLADY AKADEMII NAUK SSSR in Russian Vol 264, No 6, Jun 82
(manuscript received 10 Mar 82) pp 1417-1421

ZIN'KOVSKAYA, O. V. and GALASHIN, Ye. A., Moscow State University imeni
M. V. Lomonosov

[Abstract] A study is made of the phenomenologic and kinetic specifics of photochemical transformation of acridine in thin layers and the influence of oxygen on these processes. The specimens were illuminated and visually observed in a luminescent microscope with a mercury vapor lamp generating UV(365 mm) radiation. A layer of solution 10^{-4} to 10^{-1} cm thick was irradiated in quartz microcuvettes over its entire area. Spectrophotometric studies were performed on a Specord UV-VIS instrument. Experiments with acridine solutions from which oxygen was removed indicated that the photoseparation effect is observed only when oxygen is present. Irradiation of deaerated acridine solutions produces weak luminescence, the distribution of which corresponds to the distribution of absorbed UV irradiation in the layer. In solutions containing oxygen, heterogeneous areas limited by a clear propagating luminescence front are seen at one or more points. With or without oxygen, irradiation results in the formation of acridine reduction products in the solutions. The experiments indicate that the moving luminescent zones result from photochemical processes involving molecular oxygen. The moving ring-shaped luminescent zone is apparently the area of reaction of radicals with diffusion oxygen around an area with reduced oxygen concentration in which the radical products are formed. The possibility of observing photoseparation results from the specifics of the complex oxidation-reduction process in thin layers in which movement is hindered and the development of photochemical processes disrupts the spatially homogeneous distribution of substances. Figures 3; references 7: 2 Russian, 5 Western.
[268-6508]

UDC 621.373.826.038

NEW INORGANIC MATERIALS AND THEIR ROLE IN ASSURING PROGRESS IN ELECTRONICS AND RELATED BRANCHES

Moscow ZHURNAL VSESOYUZNOGO KHIMICHESKOGO OBSHCHESTVA IM. D. I. MENDELEYE
in Russian Vol 27, No 3, May-Jun 82 pp 293-301

REZ, I. S., doctor of chemical sciences, Chairman of theScientific Council on the Problem "Obtaining and Using Ferroelectric and Piezoelectric Materials," USSR State Committee on Science and Technology

[Abstract] The author reviews Soviet and world advances in dielectric materials, particularly ferroelectric and piezoelectric center-assymetrical products for acoustical and integral quantum electronics. The number of such eccentric

structures is more than 600,000, but currently only some 50 are being used in technology. He discusses ceramic and film piezotechnology, with special reference to perovskite types used for micropositioners, transformers, motors and high-voltage power sources. Acoustical electronics, largely surface sound waves, is a division of solid state physics related to fiber optics and laser applications. New materials include sulvanite and low-cost epitaxial zinc oxide structures on glass. Dielectrics include ceramics, monocrystals and coatings. The author discusses alloyed triglycine sulfate, beta-eucryptite and fresnoite an pyro-receivers. Quantum electronics used eccentric structures for generation, frequency adjustment and directing lasers, such as fiber-optical communication lines with large variations in refraction parameters. Discrete and constant laser modulation and deflection of laser beams also involve these materials. A potassium titanyl phosphate crystal produced in the United States in 1976 is cited for its optic non-linear quality in combination with the ray durability of KDP crystals. Amplitude and phase modulation use potassium dihydrophosphate, niobate, lithium tantalate, germano- and silicosillenate monocrystals. Reference to polyfunctional dielectrics and polar polymers concludes this review. References 176: 80 Russian, 96 Western. [279-12131]

CSO: 1841

- END -

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28 October 1982

USSR Report

CHEMISTRY

No. 92

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28 October 1982

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CHEMISTRY

No. 92

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UDC 551.464(865-16):546.18-027.32

MEASURING COSMOGENOUS PHOSPHORUS-32 IN SEA WATER

Leningrad RADIOKHIMIYA in Russian Vol 24, No 3, May-Jun 82
(manuscript received 2 Jun 81) pp 397-399

MERKUSHOV, A. V., SAPOZHNIKOV, Yu. A. and NESMEYANOV, An. N.

[Abstract] Cosmogenous phosphorus isotopes ^{32}P and ^{33}P form chiefly through the reaction of cosmic radiation with nuclei of atmospheric argon and can be used as tracers in studying atmospheric processes. As some of these cosmogenous radionuclides are removed from the atmosphere and deposited in the oceans, the authors sought to determine concentrations of the title isotope in upper layers of Pacific Ocean waters near the Kurile Islands, in samples collected in July-August 1980. It was anticipated that ^{32}P would be found with stable phosphorus orthophosphates. Test samples from which a magnesium-ammonium phosphate were precipitated and phosphorus isotopes separated showed less than half the expected quantities of ^{32}P. The authors explain this variation by the rapid absorption of phosphorus by "hydrobionts," so that dissolved and suspended organic phosphorus is found instead. The season and precise location in the ocean also affect ^{32}P quantities. The meteorological conditions and the real rate of vertical movement in upper ocean layers are also involved. References 10: 7 Russian, 3 Western.
[291-12131]

UDC 678.741:662.613.5

SMOKE FORMATION CAPACITY OF ELECTRIC INSULATION MATERIALS

Moscow PLASTICHESKIYE MASSY in Russian No 7, Jul 82 pp 48-49

OVECHKINA, G. I., GORDON, A. L., OVECHKIN, P. L., DIKERMAN, D. N., NOVIKOV, V. K., FINKEL', E. E. and NOVIKOV, G. V.

[Abstract] Materials based on polyolefins and PVC as well as fluoropolymers are used in producing cables. Thorough evaluation of their fire danger

includes smoke formation, the topic of the present study. The authors studied both burning and smoldering characteristics by the Aminco NBS optical method and a gravimetric method which determined the mass of the smoke produced. The test compositions were high and low pressure polyethylene, ethylene-alpha-butylene copolymers, vinylacetate and various thermally stabilized compositions based on high pressure polyethylene. Results showed that homo- and copolymers of ethylene emitted relatively little smoke when burning, but considerably more when smoldering; the copolymer with vinylacetate had the least smoking capacity. Thermally stabilized high pressure polyethylene also emitted significantly less smoke while burning than while smoldering. Halide antipyrines had previously been shown to produce large amounts of smoke. The best performance in terms of low smoke production came with fluoroplastics F-2M and F-4MB. Figure 1, references 3 (English).
[302-12131]

CATALYSIS

UDC 678.044.66

INVESTIGATION OF PRODUCTS FROM CATALYTIC TRANSFORMATION OF PHENYLISOCYANATE

Kiev DOKLADY AKADEMII NAUK UKRAINSKOY SSR, SERIYA B: GEOLOGICHESKIYE, KHIMICHESKIYE I BIOLOGICHESKIYE NAUKI in Russian No 7, Jul 82 (manuscript received 16 Mar 82) pp 34-38

BAKALO, L. A., LIPATOVA, T. E., KHRAMOVA, T. S. and BORISOVA, S. V., Institute of Organic Chemistry, Ukrainian SSR Academy of Sciences

[Abstract] IR and NMR spectroscopies were employed in following the reaction of phenylisocyanate with triethyleneglycol in chlorobenzene or methylethylketone, solvents with different solvating properties, in the presence of sodium acetate catalyst. The results indicated that, when the ratio NCO/OH equals 2, the reactions proceed in two stages and that the effects of the catalyst are equivalent in the second stage for the two solvent systems. In chlorobenzene the composition of the products was 19% diurethane, 26.7% allophanate, 16.3% urethane-isocyanate adduct, and 38.9% triisocyanurate. In methylethylketone the major product was the urethane-isocyanate adduct (59.3%), while the yield of triphenylisocyanurate did not exceed 1%. Figures 2; references 5: 1 Western, 4 Russian.
[317-12172]

UDC 665.658.2.001:665.772

HYDROPURIFICATION OF SOLID PARAFFINS WITH NICKEL-CONTAINING CATALYST

Moscow KHIMIYA I TEKHNOLOGIYA TOPLIV I MASEL in Russian No 7, Jul 82 pp 11-12

USHATINSKAYA, O. P., BADYSHTOVA, K. M., SHABALINA, T. N. and NAZAROV, V. I., Kazan Branch, All-Union Scientific Research Institute for Petroleum Productio

[Abstract] Solid paraffins used in foods should not contain polycyclic aromatic hydrocarbons (PAU). Selection catalytic hydrogenation of these and some resins was tested by the authors using nickel on diatomaceous earth under laboratory conditions. The process was aimed at hydroconversion of

impurities without modifying physicochemical properties of the initial paraffin. It was conducted at 180-280°C with hydrogen-containing gas circulation at 800-1400 m^3/m^3, feed at 0.5-2.0 h^{-1} and pressure of 2-4 MPa. Effects, measured on the basis of PAU content, color, change in oil content and depth of desulfurization, showed complete hydrogenation of the PAU at 220-260°C, pressure of 4 MPa, circulation frequency of 1100-1400 m^3/m^3 and feed of raw material of 0.5-2.00 h^{-1}. Sulfur content was reduced and color improved, and polycyclic aromatic hydrocarbon content did not exceed 0.0001% by weight. Figures 2; references 4 (Russian).
[298-12131]

CHEMICAL INDUSTRY

UDC 631.8

TASKS OF 11th FIVE-YEAR PLAN

Moscow KHIMIYA V SEL'SKOM KHOZYAYSTVE in Russian No 6, Jun 82 pp 3-4

KOLOMAZOV, B. I., Deputy Minister for Mineral Fertilizer Production

[Abstract] Citing the basic goals of increasing fertilizer production and assuring raw materials for such advances, the author summarizes the volume of production of chemical means of plant protection. He lists new nitrogen production facilities at the "Pridon" Chemical Plant, phosphorus production increases at the Meleuzov Chemical Plant, and increased "lenacyl" output at the Ufa "Khimprom" production association. The completed Togliatti-Odessa ammonium pipeline promises greatly expanded deliveries of liquid ammonia for agriculture, and other advances are also being made by organizations related to the Ministry. Granulated solid nitrogen and phosphorus fertilizers with anti-caking additives are available in increasing volume. A major need is to provide sufficient, appropriate rail cars to ship these products, along with better packing and storage.
[297-12131]

DEVELOPMENT OF POLYMERIZED PLASTIC PRODUCTION DURING 11th FIVE-YEAR PLAN

Moscow PLASTICHESKIYE MASSY in Russian No 7, Jul 82 pp 3-5

SAZHIN, B. I., POPOVA, I. N. and SAVVINA, Ye. A.

[Abstract] The authors review advances in production of polystyrene, polyvinylchloride polyolefins, high and low pressure polyethylene and other plastic polymers with emphasis on monetary and raw material savings resulting from their substitution for non-ferrous metals and other natural materials. Plans for the 11th Five-Year Plan include producing 85% of low pressure polyethylene by a gas-phase method and 15% by liquid phase, increasing polypropylene production 4.4-fold and polystyrene 2.3-fold, and similar increases in other polymers as new plants come into production. Product mix is also to be improved. Considerable significance is given to the production of filled and polymer-polymer compositional materials, such as

ABS-PVC combinations, fiberglass-filled polypropylene, and fiber-filled and high-dispersion mineral compositions with polypropylene. Copolymers of ethylene with propylene, alphabutylene, vinylacetate, high-molecular polyethylene, block propylene copolymers and MSP plastics will be produced in industrial quantities for the first time. A major direction during the period will be to improve quality throughout the product mix. Along with general plant expansion and improved efficiency, some directions for development include simplified polypropylene production using new catalysts, production of polystyrenes through a latex-suspension method, and improvement of environmental protection with low-waste and closed systems. Since planned levels of production cannot be attained in the European part of the USSR, plants in western Siberia and Kazakhstan will carry much of the load.
[302-12131]

PROSPECTS FOR DEVELOPING LATEX TECHNOLOGY

Moscow KAUCHUK I REZINA in Russian No 7, Jul 82 pp 2-3

CHERNAYA, V. V., Scientific Research Institute for Resins

[Abstract] Since the first mass production of latex articles in the late 1950s, that branch of rubber production has grown into an independent sector of the Soviet economy, providing synthetic sponges, protective gloves, elastic threads and numerous medical and hygienic supplies. Yet demand still exceeds supply. The 11th Five-Year Plan will seek to close the gap with domestic raw materials such as butadiene-styrene latex, 1,4-cis-polyisoprene, and butadiene-nitrile carboxylate latex. Latex production requires different stabilizers, dispersing agents, thickeners and powdering devices than those employed in other resin production, and a major problem is in manufacturing highly specialized goods in an economically feasible way. Modern equipment and human amenities are necessary at production plants. Further, labor-intensive production must be modified to allow more automation. Workers must be protected from injury from corrosive environments, and production efficiency and utilization of natural resources must be improved. An advance in this direction involves re-use of foam resin in producing sponges and latex products. Compositions based on latex, such as the "Polan-M" coating to protect large steel installations from corrosion, are currently being produced in the USSR. Greater economies are expected as new uses for latex are found.
[292-12131]

UDC 662.992.8(088.8)

DEVICE FOR EXPRESS ANALYSIS OF FLASH POINT OF PETROLEUM PRODUCTS

Moscow KHIMIYA I TEKHNOLOGIYA TOPLIV I MASEL in Russian No 7, Jul 82 pp 42-43

RUDOY, I. N., PESHCHENKO, A. D., SACHEK, A. I. and BOL'SHAKOV, G. F.,
Belorussian State University imeni V. I. Lenin

[Abstract] The authors previously described (this journal No 10, Oct 81) a device for automatically determining the flash point of petroleum products in an open crucible. They have modified it by adding a control device and movable baffle to isolate a test charge. The operation of the system is summarized. The recording device has an automatic shutoff, and feed control prevents unintentional burning of a test sample. Labor productivity and accuracy are improved, and fire danger reduced, by the device. Figure 1; references 2 (Russian).
[298-12131]

FERTILIZERS

UDC 631.893.123+636.087.74

DEVELOPING A PROCESS FOR PRODUCING ANIMAL FEEDS AND MIXED FERTILIZERS CONTAINING CARBAMIDES

Moscow KHIMICHESKAYA PROMYSHLENNOST' in Russian No 6, Jun 82 pp 343-346

SARBAYEV, A. N., POLYAKOVA, Z. A. and KORYAKIN, A. G.

[Abstract] Development and rapid introduction of new types and forms of combined fertilizers and animal feeds have great significance for the national economy. The present study relates to technical research of intermediate stages in experimental and test production of fertilizers, with specific attention directed at improving technology in the stage of neutralizing the carbamide-containing melt with phosphoric acids. Experimental data indicated that the neutralization process tested was complete in 5 minutes; longer reaction time brought a change in product composition due to carbamide hydrolysis. The test process, which produced 500 kg/hour, was accompanied by considerable heat, requiring corresponding adjustments to the apparatus. The design of the final apparatus is portrayed. The experimental equipment successfully performed in production tests, and is recommended for producing fertilizers and animal feeds. Figures 2; references 2 (Russian).
[288-12131]

UDC 631.893:661.635.213

PHYSICO-CHEMICAL BASES OF TECHNOLOGY FOR NON-CAKING MIXED FERTILIZERS CONTAINING MONOAMMONIUM PHOSPHATE

Moscow KHIMICHESKAYA PROMYSHLENNOST' in Russian No 6, Jun 82 pp 346-348

BORISOV, V. M., AZHIKINA, Yu. V., MASLENNIKOV, B. M., KAPILEVICH, S. B., GERKE, L. S. and BRODSKIY, A. A.

[Abstract] No significant production of "carboammophos" or "carboammophoska" fertilizers [hygroscopic and readily-caking products] has taken place in the

USSR due to technical deficiencies in their production relating to their undesirable properties. The authors present results of research into the title process, and describe the production of the initial monoammonium phosphate and subsequent steps. Reverse neutralization from pH = 8.0 into low pH values reduced viscosity to a point below that found in direct ammoniation. Guided crystallization of ammophos is central to producing non-caking fertilizers. The crystals produced are coated with an amorphous impurity that enhances granulation of the final product. The equipment for production is simple and low in cost, yet highly effective and durable in its operation. Figures 3; references 4: 2 Russian, 2 Western.
[288-12131]

UDC 661.717.5-965.1.002.237

HARDENING GRANULATED CARBAMIDE WITH SODIUM POLYPHOSPHATE

Moscow KHIMICHESKAYA PROMYSHLENNOST' in Russian No 6, Jun 82 pp 351-353

KUZ'MENKOV, M. I., PECHKOVSKIY, V. V., IVANOV, V. A., IL'YASHENKO, A. P., SHIROKOV, S. G. and SEDACH, M. P.

[Abstract] Ammonium sulfates and polysulfates tested as hardeners for carbamide were insufficiently effective. Sodium polyphosphate $Na_nH_2P_nO_{3n+1}$ was expected to prove a promising alternative, and the authors studied its hardening effect on carbamide granules, using electron microscopy in a special method that is summarized. Analysis of data obtained showed that sodium polyphosphate reduced the crystallization temperature of carbamide and was a highly effective hardening additive. The carbamide shop of the "Azot" Association in Grodnensk did the pilot trials, using sodium polyphosphate from the Perm' Chemical Plant. Production tests confirmed the experimental results, and full production applications are being implemented. Figures 3; references 5 (Russian).
[288-12131]

UDC 633.18:631.816.12

INCREASING YIELDS AND VIABILITY OF RICE SEEDS BY USE OF NITROGEN, PHOSPHORUS AND POTASSIUM FERTILIZERS

Moscow KHIMIYA V SEL'SKOM KHOZYAYSTVE in Russian No 6, Jun 82 pp 19-20

UKRAINSKIY, Yu. G., "Sovetskaya Rossiya" Collective Farm, Krasnodar Kray, OVCHINNIKOVA, V. A., BELOZEROV, V. A., and KRASNOOK, N. P., doctor of biological sciences, Krasnodar Polytechnical Institute

[Abstract] Current practice is to increase planting density of rice to achieve acceptable density. The present study gives results of field tests

in 1978 and 1979 with the title fertilizer components at the "Sovetskaya Rossiya" collective farm. 150 kg/hectare of nitrogen, 30 kg/ha of phosphorus and 40 kg/ha of potassium were administered separately and in combinations of nitrogen and potassium or nitrogen and phosphorus. Results showed that the highest increases came when nitrogen fertilizers were given prior to tillering and again prior to blossoming. The first application enhanced shoot formation, thus increasing crop density, while fertilizing before blossoming lengthened the time during which the grains filled out. Fertilizing with potassium and phosphorus had little effect, but under low temperature conditions, both nitrogen and potassium, particularly the latter, were beneficial. References 3 (Russian).
[297-12131]

UDC 631.81

BIOLOGICAL EFFECTIVENESS OF CHEMICAL SUBSTANCES IN GRAIN PRODUCTION

Moscow KHIMIYA V SEL'SKOM KHOZYAYSTVE in Russian No 6, Jun 82 pp 53-56

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[Abstract] In monitoring grain quality, using white mice, chicks and infusoria as test subjects on the one hand, and chemical methods on the other, the authors found that results frequently varied, especially in terms of protein content. They hypothesized that factors ranging from enzyme inhibitors to unfavorable combinations of highly active nutrients could be involved. In the present study they sought to differentiate between the beneficial portion of accumulated protein and the total protein content. They developed a method of calculating "pure" protein retention in laboratory animals on the basis of a coefficient of protein effectiveness, which can be determined simultaneously with the previously used coefficient of feed effectiveness. The method was tested on white male rats that were fed wheat samples that had received natural fertilizer, NPK or NPK+natural fertilizer. Results showed that while the biopotential of wheat receiving manure rose 21%, grain protein content increased only 6%. With NPK and manure similar results were obtained, but mineral fertilizer alone raised the parameters in the opposite manner: while protein content increased 18%, actual biopotential exceeded the control grain by only 6.8%. Thus the test method was regarded as a more effective measure of true economic benefits from fertilizers. References 23 (Russian).
[297-12131]

UDC 631.83:633.491

SIGNIFICANCE OF INCREASED NITROGEN/PHOSPHORUS NUTRITION IN ALLEVIATION OF CHLORINE TOXICITY (IN POTASSIUM SALT) ON YIELD AND BIOLOGICAL VALUE OF POTATO TUBERS

Moscow AGROKHIMIYA in Russian No 6, Jun 82 (manuscript received 14 Apr 81) pp 68-72

KULIKOV, Ya. K., IVANOV, N. P. and MEDVEDEV, A. G., Belorussian State University, Minsk

[Abstract] Studies were conducted on the effects of various levels of nitrogen/phosphorus fertilizers on yield, protein content, and amino acid composition of Zazerskiy potatoes grown on dernovo-podzolic soil in relation to the toxic effect of chlorine in potassium salt fertilizer or the application of potassium sulfate. The results showed that addition of potassium salt decreased the crop yield by 9.6 centners/ha, while application of potassium sulfate increased the harvest by 18.0 centners/ha. Increasing the application of the nitrogen fertilizer decreased the toxic effects of the chlorine present in the potassium salt fertilizer 2.5 fold, and nitrogen/phosphorus fertilizers were even more effective; in addition, the concentration of chlorine in the tubers decreased from 231 to 137 mg%. The decrease in the chlorine concentration was accompanied by elevation of the protein content of the tuber and an increase in the concentration of the essential amino acids. Figures 1; references 6 (Russian).
[323-12172]

UDC 631.82

ANALYSIS OF AGRONOMIC EFFECTIVENESS OF MINERAL FERTILIZERS, PART 2: EVALUATION OF DIFFERENTIAL METHOD

Moscow AGROKHIMIYA in Russian No 6, Jun 82 (manuscript received 9 Jul 81) pp 107-111

KOROGODOV, N. S., Scientific Institute of Fertilizers, Insecticides, and Fungicides, Moscow

[Abstract] An analysis of the effectiveness of mineral fertilizers in increasing crop yields, showed that the resultant increment in the crop yield is not a product of simple arithmetic addition of the increases to be expected from the addition of individual fertilizers (N, K, or P). The factor that is generally neglected in such calculations is the soil concentration of N, K, or P which will contribute to the optimum levels of added mineral fertilizers for a given crop. Consequently, meaningful calculations have to take into account existing mineral conditions in the soil and the contribution they make to the effectiveness of fertilizers. Otherwise meaningless data are obtained which lead to absurd cost-effectiveness calculations for mineral fertilizers. References 5 (Russian).
[323-12172]

UDC 631.859

EFFECT OF SOLUBLE PHOSPHATES ON ASSIMILATION OF ELEMENTARY RED PHOSPHORUS DURING YEAR OF APPLICATION OF PHOSPHATE MIXTURE TO SOIL

Moscow AGROKHIMIYA in Russian No 7, Jul 82 (manuscript received 28 Jul 81)
pp 34-42

GLADKOVA, K. F. and BULAYEVA, V. G., Dolgoprudnyy Agrochemical Experimental Station imeni D. N. Pryanishnikov; Scientific Institute of Fertilizers, Insecticides, and Fungicides, imeni Ya. V. Samoylov, Moscow Oblast

[Abstract] Radioisotope studies were conducted to determine the effects of soluble phosphates on the assimilation of red phosphorus by Orel oats grown in vessels on dernovo-podzolic loam (Moscow Oblast) and high-quality chernozem soil (Khar'kov Oblast). The results of the experiments demonstrated that in application of red phosphorus and KH_2PO_4 in a 2:1 ratio the assimilation of the former is 1.6-3.1-fold lower than of the soluble potassium phosphate, but that red phosphorus accounts for 19-32% of total phosphorus uptake. Application of red phosphorus in a ratio of 1:1 to KH_2PO_4 showed that red phosphorus accounted for only 16-21% of the total phosphorus uptake. The uptake of red phosphorus was immediate and did not require preliminary transformation into a soluble form via oxidation. Figures 2; references 5: 1 Western, 4 Russian.
[324-12172]

UDC 631.811:631.85

POSSIBILITY OF PERIODIC APPLICATION OF AMMOPHOS, UREA PHOSPHATE, AND LIQUID AND SOLID FORMS OF AMMONIUM POLYPHOSPHATE ON DERNOVO-PODZOLIC SOIL, PART 2: LEVELS, REMOVAL, AND BALANCE OF NUTRIENTS

Moscow AGROKHIMIYA in Russian No 7, Jul 82 (manuscript received 7 Aug 80)
pp 47-54

KUZ'MENKOV, A. V., FILATOVA, L. M. and YANISHEVSKIY, F. V., Scientific Institute of Fertilizers, Insecticides, and Fungicides, imeni Ya. V. Samoylov, Moscow

[Abstract] Studies were conducted on the effectiveness of periodic and annual application of water-soluble phosphates on the uptake of nitrogen, phosphorus, and potassium by winter wheat (Mironovskaya 808) and potatoes (Lorch) from dernovo-podzolic soil. The results showed that periodic and annual application of phosphorus to dernovo-podzolic soil may initially increase the levels of nutrients in the plants and soil on acidic soil with poor fertility, but that with continuous cultivation the manner of phosphorus application has no telling effect on the parameters in question. References 13: 1 Western, 12 Russian.
[324-12172]

UDC 631.811.98:(470.6)

ACCUMULATION OF STRONTIUM-90 AND CESIUM-137 IN CROPS IN RELATION TO PHYSICOCHEMICAL CHARACTERISTICS OF SOIL

Moscow AGROKHIMIYA in Russian No 7, Jul 82 (manuscript received 14 Aug 81) pp 117-119

MALIKOV, V. G., PEREPELYATNIKOVA, L. V. and ZHUKOV, B. I., North Caucasian Scientific Research Institute of Phytopathology, Krasnodar

[Abstract] Studies were conducted on the effects of soil levels of calcium carbonate on crop (grains, vegetables, fodder) uptake of strontium-90 and cesium-137. The results showed that a soil content of 2.2-3.2% carbonate reduced strontium-90 accumulation in the plants 1.1-3-fold, and promoted cesium-137 uptake 1.3-4-fold. It appears that the calcium carbonate levels in the soil are responsible for the extent to which strontium-90 is firmly bound to soil particles and that elevated levels of carbonate favor the formation of soluble forms of cesium-137 which are more easily assimilated by plants. References 6 (Russian).
[324-12172]

UDC 543.422.27:541.515:547.1'118

NITROXYL PHOSPHORUS-CONTAINING RADICAL WITH TWO C-P BONDS

Moscow IZVESTIYA AKADEMII NAUK SSSR: SERIYA KHIMICHESKAYA in Russian No 6, Jun 82 (manuscript received 29 Jan 82) pp 1434-1435

KARDANOV, N. A., TRIFONOVA, S. A., ZHDANOV, R. I., GODOVIKOV, N. N. and KABACHNIK, M. I., Institute of Heteroorganic Compounds imeni A. N. Nesmeyanov, USSR Academy of Sciences, Moscow; Scientific Research Institute for Biological Testing of Chemical Compounds, Kupavna

[Abstract] The authors synthesized a nitroxyl phosphonate (I) that is a paramagnetic model of esters of alpha-oxyphosphinic acids which have muscarinolytic activity. The synthesis was accomplished by oxidation (of the corresponding amine of I) using m-chloroperbenzoic acid or H_2O_2 with sodium tungstate. The ESR spectrum of I in benzene was a triplet with $a_N = 15.5$ gauss and $5.5 \cdot 10^{23}$ spin/mole. Chemical procedures are summarized. References 4: 3 Russian, 1 English.
[285-12131]

UDC 541(124.7+127)+547(223+258.11)

FREE RADICAL REACTION MECHANISMS, PART 16: STEREOSELECTIVITY OF FREE RADICAL DEHALOGENATION OF EXO- AND ENDO-2-BROMONORBORNANES

Leningrad ZHURNAL ORGANICHESKOY KHIMII in Russian Vol 18, No 7, Jul 82 (manuscript received 7 Dec 81) pp 1482-1485

DNEPROVSKIY, A. S., PERTSIKOV, B. Z. and TEMNIKOVA, T. I., Leningrad State University imeni A. A. Zhdanov

[Abstract] The method of competitive reactions was employed in studies on free radical reduction of exo- and endo-2-bromonorbornanes, using the organic hydride radical $R_3E\cdot$ ($R = C_2H_5$, C_4H_9, $(CH_3)_3SiCH_2$; E = Si, Ge, Sn). The preferential detachment of the exo-atom Br, as well as the changes in selectivity vis-a-vis the free radical employed, were ascribed to torsion

effects in the transitional phase of the Br atom transfer. Furthermore, the relative rate of Br detachment was virtually temperature-independent, which indicates entropic control of selectivity and the fact that reactivity was dependent on steric interactions. References 18: 3 Russian, 15 Western. [325-12172]

UDC 547.421+547.412.124+541.124

FREE RADICAL TRANSFORMATIONS OF 2-ALKOXY-1,3-DIOXOLANES IN POLYHALOGENALKANES

Leningrad ZHURNAL ORGANICHESKOY KHIMII in Russian Vol 18, No 7, Jul 82 (manuscript received 13 Apr 81) pp 1486-1489

ROL'NIK, L. Z., KALASHNIKOV, S. M., PASTUSHENKO, Ye. V., ZLOTSKIY, S. S. and RAKHMANKULOV, D. L.

[Abstract] Investigations on the free radical transformations of 2-alkoxy-1,3-dioxolanes showed that 2-ethoxy-1,3-dioxolane in bromoform is acted on by radicals formed from thermal decomposition of benzoyl peroxide to yield ethylenecarbonate, ethyl(2-bromoethyl)carbonate, acetaldehyde, 2-bromoethylformate, and bromoethane. The products initiated by tert-butyl peroxide from 2-hexoxy-1,3-dioxolane in chloroform are ethylenecarbonate, hexyl(2-chloroethyl)carbonate, ethylhexylcarbonate, caproaldehyde, 2-chloroethylformate, and hexane. A flow chart is included for the transformation of 2-alkoxy-1,3-dioxolanes. References 5 (Russian). [325-12172]

UDC 542.85:[547.569.3+547.413.4]

FREE RADICAL CHLOROVINYLATION OF DIPHENYL SULFIDE WITH TRICHLOROETHYLENE

Leningrad ZHURNAL ORGANICHESKOY KHIMII in Russian Vol 18, No 7, Jul 82 (manuscript received 15 Dec 81) pp 1555-1556

MIRSKOVA, A. N., MARTYNOV, A. V. and VORONKOV, M. G., Institute of Organic Chemistry, Siberian Branch, USSR Academy of Sciences, Irkutsk

[Abstract] Reaction of trichloroethylene with diphenyl sulfide resulted in the production of phenyl-beta,beta-dichlorovinylsulfide, phenyltrichlorovinylsulfide, and small quantities of trans-phenyl-alpha,beta-dichlorovinylsulfide, as well as low boiling-point compounds apparently representing trichloroethylene oligomers. The least amount of conversion occurred when the reaction was initiated with benzoyl peroxide (10% in 30 h); with UV irradiation in pyrex tube, 90% conversion was obtained in 28 h, and in a quartz tube 80-85% conversion was seen in 18-20 h. References 4: 1 Russian, 3 Western. [325-12172]

ION EXCHANGE PHENOMENA

UDC 546.841:66.08

EFFECTIVENESS OF ION EXCHANGE SEPARATION OF THORIUM AND SCANDIUM

Leningrad RADIOKHIMIYA in Russian Vol 24, No 3, May-Jun 82
(manuscript received 9 Oct 81) pp 390-393

KAZANTSEV, Ye. A., BEZVORITNIY, V. A. and KHOLMOGOROV, S. N.

[Abstract] Current methods for ion exchange separation of thorium and scandium are based on selective elution from ionites by solutions of organic complex-forming substances after quantitative sorption; these methods consume expensive reagents, with little yield. The authors present results of separating the title elements directly at the stage of sorption by ionites from hydrochloride solutions, using various domestic resins containing sulfur, carboxyl or phosphorus as bases. Porous ionites were found to be more adsorbing for thorium than more similar gel types, and carboxyl-containing ionites at pH < 1 were the least suitable. Thorium was found to adsorb more readily in most cases than scandium, thus guaranteeing the desired separation on all ionites except an aminocarboxyl ampholyte (ANKB-10). Desorption of partially adsorbed scandium from sulforesins was accomplished using neutral salt solutions, while thorium was effectively desorbed by sulfate- and carbonate-containing solutions. Figures 2; references 10: 8 Russian, 1 Polish, 1 English.
[291-12131]

UDC 547.79.371:385.1

ATTACHING DI(HYDROXYMETHYL)TRIAZOLS AND OXADIAZOL TO ACTIVATED SHORT BONDS

Leningrad ZHURNAL ORGANICHESKOY KHIMII in Russian Vol 18, No 6, Jun 82
(manuscript received 26 Oct 81) pp 1319-1324

KIRILLOVA, L. P., TIKHONOVA, L. G., GAREYEV, G. A. and VERESHCHAGIN, L. I.,
Institute of Petroleum and Coal Chemical Synthesis of the Irkutsk State
University imeni A. A. Zhdanov, Angarsk

[Abstract] Continuing earlier research, the authors studied attachment of 1-alkyl-4,5-di(hydroxymethyl)-1,2,3-triazols and 3,4-di(hydroxymethyl)-1,2,5-oxadiazol to double bonds of vinylbutyl ester and acrylonitrile, and to triple bonds of mono- and diacetylene ketones. Results showed that 1-butyl-4,5-di(hydroxymethyl)-1,2,3-triazol and 3,4-di(hydroxymethyl)1,2,5-oxadiazol very easily react to produce good yields of the corresponding acetals in the presence of catalytic quantities of hydrochloric acid; the first required heating to 30-50°C, but the second produced heat. Nucleophile attaching of diols to the double bond of acrylonitrile took place in the presence of a strong base (KOH), producing monocyanoethyl esters, alcohols and in the case of the cyanoethylation of glycol, a 10% yield of dicyanoethyl ester. While alcohols and phenols attach to alpha-acetylene ketones to form alkoxy(aroxy)vinylketones, secondary attaching of the nucleophile to the double bond of alkoxyvinylketones is hampered by competition from the carbonyl group and ether oxygen. The diacetylene ketone 1,5-diphenyl-1,4-pentadiine-3-one reacts with alcohols primarily at a single acetylene bond, with the electrophilicity of the second triple bond decreasing due to the electron donor action of the alkoxy residue, hampering attachment. All products were confirmed by infrared spectra. Chemical procedures are given in the experimental section. References 7 (Russian).
[284-12131]

UDC 542.942.6:546.267:547.239.2

REDUCING CYANIDE AND ACETONITRILE BY PROTON NITROGEN-FIXING SYSTEMS

Moscow IZVESTIYA AKADEMII NAUK SSSR: SERIYA KHIMICHESKAYA in Russian
No 6, Jun 82 (manuscript received 29 Jul 81) pp 1258-1260

PERSHIKOVA, N. I., NIKONOVA, L. A. and KITAYGORODSKIY, A. N.,
Institute of Chemical Physics, USSR Academy of Sciences, Chernogolovka

[Abstract] The physiological function of nitrogenase is to reduce N_2 to NH_3, but several other reductive reactions have been noted in the enzyme system. The authors compared the enzyme's reactions to those of model proton nitrogen-fixing systems to study the reactions of CN^- and CH_3CN in model systems based on V(II), Cr(II) and Ti(III). In all the systems studied, and in contrast to the enzyme, the basic products of reduction by both substrates used were amines, with noticeable quantities of hydrocarbons forming only on Ti and Cr hydroxides. There was no correlation between the effectiveness of the model systems and ratios of four- and six-electron reduction of the two substrates. The tested systems in some cases modelled the enzyme action, as when the molybdenum-thiol system reduced cyanide and acetonitrile to hydrocarbons and ammonia. References 5: 1 Russian, 4 Western.
[285-12131]

UDC 543.422.4:543.422.6:547.583.7

INFRARED AND ULTRAVIOLET SPECTRA OF ALPHA- AND BETA-METHYLHYDRAZIDES OF AROMATIC ACIDS

Moscow IZVESTIYA AKADEMII NAUK SSSR: SERIYA KHIMICHESKAYA in Russian
No 6, Jun 82 (manuscript received 23 Sep 81) pp 1405-1408

SARAPULOVA, G. I., CHIPANINA, N. N., VOLKOVA, L. I., SULTANGAREYEV, R. G., KHLOPENKO, N. A., LOPYREV, V. A. and FROLOV, Yu. L., Institute of Organic Chemistry, Siberian Branch, USSR Academy of Sciences, Irkutsk

[Abstract] While the structure, reactivity and pH properties of unsubstituted aromatic acid monohydrazides have received much attention, the effect of substitution on the molecular structure of alpha- and beta-methylsubstituted mono- and dihydrazides has received little study. The authors studied the infrared and ultraviolet spectra of such hydrazides. Absorption band data indicate that the C=O and NH groups are joined in an intermolecular hydrogen bond. The presence of substituents on the nitrogen atoms leads to changes in atomic configuration of the hydrazine fragment. The position of a biphenyl system suggests weaker intermolecular bonds in dihydrazides than in monohydrazides. Figure 1; references 9: 7 Russian, 2 English.
[285-12131]

UDC 541.621.2:547.298.61'161

CONFORMATIONAL ISOMERISM OF 1,2-DIFORMYL-, DIACETYL-, AND DI(TRIFLUORACETYL)-HYDRAZINES AND THEIR METHYL ANALOGS

Moscow IZVESTIYA AKADEMII NAUK SSSR: SERIYA KHIMICHESKAYA in Russian No 6, Jun 82 (manuscript received 22 Dec 81) pp 1428-1430

KALIKHMAN, I. D., BANNIKOVA, O. B., MEDVEDEVA, Ye. N., YUSHMANOVA, T. I. and LOPYREV, V. A., Institute of Organic Chemistry, Siberian Branch, USSR Academy of Sciences, Irkutsk

[Abstract] Delayed rotation around N-CO and N-N bonds of diacylhydrazines is a property of a large number of rotamers. NMR and PMR data indicate isomerism only for N,N'-dibenzylcarbalkoxy-, diacetyl- and tetraacetylhydrazines, while for 1,2-diacylhydrazines and their MeN analogs, and apparently for hydrazone derivatives, the rotation barrier for the N-N bond is 5-7 kilocalories/mol. The authors studied conformational features of 1,2-diacylhydrazines and analogous systems. The best spectral relationships were found for 1,2-dimethyl derivatives. The effect of structure and environment on conformer frequency is discussed. References 15: 4 Russian, 11 Western.
[285-12131]

ORGANOMETALLIC COMPOUNDS

UDC 541.63:541.49:547.567:546.811'131

STEREOCHEMICAL FEATURES OF PARAMAGNETIC COMPLEX FORMED IN REACTION OF 3,6-DI-TERT.BUTYLORTHOBENZOQUINONE WITH TETRACHLOROSTANNANE

Moscow IZVESTIYA AKADEMII NAUK SSSR: SERIYA KHIMICHESKAYA in Russian
No 6, Jun 82 (manuscript received 8 Jul 81) pp 1275-1282

PROKOF'YEV, A. I., KASYMBEKOVA, Z. K., BUBNOV, N. N., SOLODOVNIKOV, S. P.
and KABACHNIK, M. I., Institute of Heteroorganic Compounds
imeni A. N. Nesmeyanov, USSR Academy of Sciences, Moscow

[Abstract] Orthoquinones react with halides of metals of the third and fourth groups to form chelate paramagnetic complexes; the latter have been studied by electron spin resonance, and found to form by ligand substitution (of a chlorine atom in the metal halide) by orthoquinone. The unpaired electron reacts with ring protons of the aromatic ligand and magnetic isotopes of the central atom. To further explain these processes, the authors studied the impact of temperature, solvent type and complexing additives with a 3,6-di-tert.butylpyrocatechin ligand. Temperature changes from 0 to 100°C had an inverse relationship to linking with chlorine atoms, with a transition from quadruplet to deciplet. The high rotation barrier of the $SnCl_3$ group in the paramagnetic complex was attributed to the chelate structure in which the Sn atom was bonded to 2 oxygen atoms. Further discussion centers on the impact of complexing additives on electron spin resonance spectra. Toluene and ethanol are grouped with tetrahydrofurane as additives with little impact, while a group of acetone, acetonitrile and dimethylformamide caused more noticeable changes. The complex was found to have a five-membered structure which changed to an octahedron as electron donor molecules were coordinated to a tin atom. Figures 4; references 11: 6 Russian, 5 Western.
[285-12131]

UDC 542.941.7-128:547.592.12:547.73

NEW HYDROGENATION SYSTEMS IN ION HYDROGENATION REACTION

Moscow IZVESTIYA AKADEMII NAUK SSSR: SERIYA KHIMICHESKAYA in Russian No 6, Jun 82 (manuscript received 5 Aug 81) pp 1322-1326

BOLESTOVA, G. I., LATYPOVA, F. M., PARNES, Z. N. and KURSANOV, D. N., Institute of Heteroorganic Compounds imeni A. N. Nesmeyanov, USSR Academy of Sciences, Moscow

[Abstract] The common ion hydrogenation (IR) reaction generally uses triethylsilane as a donor, but a search for new hydrogenation systems that would allow further application of IR has been in process. The authors discuss ethyldichlorosilane (EDCS) in this reaction. It requires the presence of Lewis's acid to promote Si-H breakdown and increase the concentration of carbocations. The authors found that with $AlCl_3$ or $AlBr_3$, EDCS reacts with olefins, haloid alkyls, trifluoroacetates of alcohols and 2-alkylthiophenes. 1-methylcyclohexene reacted with EDCS and toluene-sulfonic acid in the presence of an equimolar quantity of $AlHal_3$ to form methylcyclohexane, a product of hydration with 65-75% yield after 2 hours at 40°C. EDCS and $AlHal_3$ brought hydrogenolysis of haloid alkyls leading to saturated hydrocarbons, with yields varying from 40-80%. Reactions with other C-H donors produced far lower yields. Results showed that aromatic hydrocarbons with a tertiary carbon atom in a side chain can be used in the presence of aluminum haloids to obtain saturated hydrocarbons from olefins, haloid alkyls and alcohol trifluoroacetates. Chemical procedures are given in the experimental section. References 7: 2 Russian, 5 Western.
[285-12131]

UDC 542.91;547.1'119:547.235.4

REACTION OF 2,5-DIPHENYLDIAZOARSOL WITH DIPHENYLDIAZOMETHANE

Moscow IZVESTIYA AKADEMII NAUK SSSR: SERIYA KHIMICHESKAYA in Russian No 6, Jun 82 (manuscript received 18 Jan 82) pp 1432-1433

ARBUZOV, B. A., DIANOVA, E. N. and CHADAYEVA, N. A., Chemical Institute imeni A. M. Butlerov, Kazan' State University imeni V. I. Ul'yanov-Lenin

[Abstract] Previously examples of diazoarsol and nitrons were used to show cycloattachment at the As=C bond of bicoordinated arsenic atoms. The authors show here that the title reaction at 80°C without a solvent leads to the attachment of diphenylcarbene at the As=C bond. The product is 2,4,6,6-tetraphenyl-1-arsa-2,3-diaza-bicyclo-[3,1,0]-hexene-3. Composition and structure were confirmed by infrared, ^1H and ^{31}P NMR, and mass spectra. References 2 (Russian).
[285-12131]

ORGANOPHOSPHORUS COMPOUNDS

UDC 541.127.4:547.1'118

ALKALINITY OF PHOSPHONYLALKYLAMINES IN WATER AND ETHANOL

Moscow IZVESTIYA AKADEMII NAUK SSSR: SERIYA KHIMICHESKAYA in Russian No 6, Jun 82 (manuscript received 11 Jun 81) pp 1265-1267

KURGUZOVA, A. M., KUDRYAVTSEVA, L. A., TEYTEL'BAUM, A. B., BEL'SKIY, V. Ye. and IVANOV, B. Ye., Institute of Organic and Physical Chemistry imeni A. Ye. Arbuzov, Kazan' Branch, USSR Academy of Sciences

[Abstract] In studying ionization of phosphonylcarboxylic acids, it was found that the phosphonyl group influenced the reaction center by an induction method. The authors compared the nature of a phosphonyl group effect on pK_a of amines and carboxylic acids. The magnitude of pK_a of phosphinylalkylamines measured in water and ethanol correlated with the sum of induction constants of substituents at the nitrogen atom; correlations improved markedly as amines with phosphonyl groups in the alpha-position were separated. When ethanol replaced water in the reactions, the pK_a of the amines changed in agreement with the Bronsted principle. The good correlations of substituted alkylmethylamines point to the conclusion that their alkalinity is determined by the induction effect of substituted alkyls and is not sensitive to steric influence of substituents.
Figure 1; references 8: 5 Russian, 3 Western.
[285-12131]

UDC 542.97:547.1'118

ACID CATALYSIS IN REACTIONS OF TRITHIOPHOSPHITES WITH ACYLHALIDES

Moscow IZVESTIYA AKADEMII NAUK SSSR: SERIYA KHIMICHESKAYA in Russian No 6, Jun 82 (manuscript received 31 Jul 81) pp 1386-1388

AL'FONSOV, V. A., ZAMALETDINOVA, G. U., BATYYEVA, E. S. and PUDOVIK, A. N., Institute of Organic and Physical Chemistry imeni A. Ye. Arbuzov, Kazan' Branch, USSR Academy of Sciences

[Abstract] In contrast to oxygen-containing acid esters of P(III), thioesters react with acylhalides while maintaining the coordination number of phosphorus,

yielding products with thioalkyl groups substituted at the haloid. Previous studies showed that the great majority of substitutions and exchanges for P(III)-O as well as P(III)-N systems involve acid catalysts. To demonstrate the hypothesis that acid impurities in the initial reagents are responsible for the formation of final products in the title reaction, the authors studied reactions of triethyltrithiophosphite with acetylbromide and trichloroacetylchloride. The composition and structure of the compounds produced were verified by infrared and ^{31}P NMR spectra. The effects of adding acetic acid, hydrogen chloride and water to the reacting mixture were also assessed, indicating that water or acid additives accelerated the process of attaching the thioalkyl group to the haloid. Apparently the acid catalyst contributed to the formation of an anhydride derivative of P(III) and a mercaptan. Chemical procedures are given in the experimental section. References 8: 6 Russian, 2 English.
[285-12131]

UDC 542.91:547.1'118

NEW BICYCLIC PHOSPHORANES WITH P-H BONDS

Moscow IZVESTIYA AKADEMII NAUK SSSR: SERIYA KHIMICHESKAYA in Russian No 6, Jun 82 (manuscript received 27 Oct 81) pp 1408-1409

PUDOVIK, M. A., TERENT'YEVA, S. A. and PUDOVIK, A. N., Institute of Organic and Physical Chemistry imeni A. Ye. Arbuzov, Kazan' Branch, USSR Academy of Sciences

[Abstract] Properties of P-alkylated 4,5-benzo-1,3,2-oxazaphospholanes depend greatly on the nature of substitution at the endocyclic nitrogen atom. The authors studied these compounds with hydroxyalkyl groupings at the N atom and hypothesized that HO groups contributed to stabilization of such systems. Initial compounds used were diamides of alkyl(aryl)phosphonium acids and N-(beta-hydroxyethyl)-*o*-aminophenol. The expected oxazaphospholane derivatives did not form; rather, bicyclic phosphoranes with P-H bonds were produced by intramolecular attaching to P(III) in the beta-position of the HO group. Their structure was confirmed by ^{31}P and ^{1}H NMR, infrared spectroscopy and element analysis. Chemical procedures are given in the experimental section. References 4: 3 Russian, 1 English.
[285-12131]

UDC 542.91:547.1'118

REACTION OF PHOSPHINES WITH DIPHENYLCARBODIIMIDE

Moscow IZVESTIYA AKADEMII NAUK SSSR: SERIYA KHIMICHESKAYA in Russian No 6, Jun 82 (manuscript received 24 Nov 81) pp 1416-1417

PUDOVIK, A. N., ROMANOV, G. V. and STEPANOVA, T. Ya., Institute of Organic and Physical Chemistry imeni A. Ye. Arbuzov, Kazan' Branch, USSR Academy of Sciences

[Abstract] Little has been published on reactions of primary or secondary phosphines with carbodiimides. At about the same time results of the reaction of di-p-tolylcarbodiimide with diphenylphosphine were reported, the authors found in studying reactions of dibutyl-, diphenyl- and phenylphosphine with diphenylcarbodiimide that secondary and primary phosphines react readily with that compound, forming corresponding formamidinophosphines. The reaction capability of phosphine containing a trimethylsilyl group at the P atom increases sharply, so that the reaction with diphenylcarbodiimide is accompanied by a strong exothermal effect leading to formation of 1-trimethylsilyl-1,2,3-phosphaguanidine. When formamidinophosphines are treated with CH_3I, the P-C bond in the P-C=N fragment breaks and corresponding methylphosphoniumiodides form. Chemical procedures are given in the experimental section. References 5: 3 Russian (1 translation from English?), 2 Western.
[285-12131]

UDC 543.422.25:541.63:547.1'119

PMR SPECTRA AND CONFORMATION OF CERTAIN SEVEN-MEMBER HALOIDANHYDRIDES AND ESTERS OF ARSENOUS ACID WITH PLANAR FRAGMENT

Moscow IZVESTIYA AKADEMII NAUK SSSR: SERIYA KHIMICHESKAYA in Russian No 6, Jun 82 (manuscript received 18 Jan 82) p 1432

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[Abstract] The authors made the first study of conformational properties of certain 2-substituted 5,6-benzo-1,3,2-dioxaarsepine and 1,3,2-dioxaarsepines. Comparison of chemical shifts of methylene protons of six- and seven-member heteroanalogs confirm a skewed balance in the firection of the a-chair form. One product showed significantly broader lines in the PMR spectra, depending on the concentration and type of solvent. References 4: 3 Russian, 1 Western.
[285-12131]

UDC 542.91:547.1'118

SYNTHESIS OF 1,3,4-TRIPHENYL-1,3,4-AZADIPHOSPHACYCLOPENTANE

Moscow IZVESTIYA AKADEMII NAUK SSSR: SERIYA KHIMICHESKAYA in Russian
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[Abstract] When a mixture of phenylphosphine and bis(diethylaminomethyl)phenyl phosphine is heated at 130-150°C $(PhP)_5$ and $(PHP)_4CH_2$ are formed (Kaska, et al., 1974). The authors of the present article found that adding phenylazomethylene to that reaction led to formation of a new heterocycle with a P-P bond, the title system. The structure was confirmed by mass-spectrum. Reference 1 (Western).
[285-12131]

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DYNAMIC STEREOCHEMISTRY OF PHOSPHORYLATED N,S-DIMETHYL-N'-ALKYLISOTHIOUREA: Z,E-ISOMERIZATION AND PHOSPHOROTROPY

Moscow DOKLADY AKADEMII NAUK SSSR in Russian Vol 265, No 1, Jul 82
(manuscript received 20 Nov 81) pp 106-108

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[Abstract] Previously the authors studied *Z,E*-stereoisomerization of a number of N-phosphoryl(thiophosphoryl)-N',S-dialkylisothioureas. In the present work transformations are examined in a number of N-dialkoxyphosphoryl-N,S-dimethyl-N'-alkylisothioureas obtained by the Atherton-Todd reaction of N-alkyl-N,S-dimethylisothioureas with dialkylphosphites in the presence of triethylamine in a medium of carbon tetrachloride. Asymmetrical trisubstituted isothioureas were phosphorylated at both the methyl and ethyl group nitrogen atoms. At temperatures up to 100°C rapid *Z,E*-isomerization occurred while temperatures of 180-200°C were accompanied by phosphorotropic tautomery. Rates of *Z,E*-isomerization were not related to the nature of the solvent, nor was the free energy of phosphorotropy dependent on the concentration. Thus phosphorotropic transformation occurred primarily by an intramolecular mechanism. Chemical details are given in an experimental section. References 6 (Russian).
[293-12131]

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REACTION OF TRIMETHYLSILYLPHENYLPHOSPHINE WITH CARBONYL COMPOUNDS

Moscow IZVESTIYA AKADEMII NAUK SSSR: SERIYA KHIMICHESKAYA in Russian No 6, Jun 82 (manuscript received 24 Nov 81) pp 1417-1419

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[Abstract] While related reactions have received much attention, little has appeared on reactions of P(III) derivatives such as $RPH(SiMe_3)$. Continuing their earlier research, the authors studied the reaction of the title phosphine with benzaldehyde and a methyl ester of pyroracemic acid. Differential thermal analysis data of the first reaction show that it is accompanied by an exothermal effect beginning at 60°C and continuing to 85°C, yielding a mixture of isomers of alpha-trimethylsiloxybenzylphenylphosphine. Reaction with the methyl ester of pyroracemic acid takes place in an exothermal manner and leads to a mixture of diastereomers of (alpha-trimethyl-siloxy)-alpha-carbomethoxyethylphenylphosphine. Chemical procedures are given in the experimental section. References 6 (Russian). [285-12131]

PESTICIDES

INTRODUCTION TO PLANT GROWTH REGULATORS

Moscow REGULATORY ROSTA RASTENIY (NOVOYE V ZHIZNI, NAUKE, TEKHNIKE: SERIYA 'KHIMIYA') in Russian No 6, Jun 82 (signed to press 9 Jun 82) pp 2-7, 56-62, 64

[Annotation, table of contents, biographical sketches of authors, foreword and chapter titled "Use of Plant Growth Regulators in Practical Plant Growing" from book "Plant Growth Regulators" by Yuriy Aleksandrovich Baskakov and Aleksandr Alekseyevich Shapovalov, published in "Advances in Life, Science, Technology: Chemistry Series", Izdatel'stvo "Znaniye", 28,680 copies, 64 pages]

[Text] Harmonic development of plants occurs owing to certain substances called biological phytohormones. The following question was posed to chemists: Can synthetic analogues of these natural substances be found, and can they be used to raise the productivity of agricultural crops? This book describes how this truly miraculous chemistry developed. It will be useful to lecturers, propagandists and students of people's universities.

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Biographical Sketches of Authors

Reviewers: Candidate of Chemical Sciences B. L. Korsunskiy, Doctor of Chemical Sciences B. A. Khaskin.

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Aleksandr Alekseyevich Shapovalov--candidate of biological sciences, chief of the sector for biological testing of plant growth regulators. Known for a number of works on the methods of selecting synthetic substances possessing growth regulating properties.

Foreword

Creation of an effective system of controlling the growth and development of plants has been and continues to be one of the important tasks facing mankind. The reason for this lies in the important role played by plants in the life of man and in all of the earth's biosphere. A significant proportion of the energy and labor invested into agricultural production and its complex agrotechnical procedures is aimed precisely at achieving a controlling influence by which to force plants to function in the way we need them to, though unfortunately we are not always successful in this effort.

Each successive stride on this road is more and more difficult. In the meantime a significant share of mankind has suffered and continues to suffer from a chronic food shortage throughout all of its history. This is why attempts are being made to utilize practically all achievements of science and technology to raise the productivity of plant growing. Today for example, in the beginning of the era of laser technology, attempts are being made to illuminate plants with laser beams, while at the beginning of this century, when enormous successes were achieved in chemistry, it seemed a natural idea to create substances which could cause plants to assume gigantic proportions.

In the organism, we distinguish between regulation at the intracellular and the extracellular (intercellular) levels. Growth and development are regulated, in the final analysis, at the cellular level on the basis of interaction between cells. Growth of an organ or an organism is the accumulation of the growth of its cells, while formation of specific organs or certain structural parts making up an organ is the result of the paths of development taken by cells.

Every living organism is subjected to continual quantitative and qualitative changes which may be interrupted by periods of rest. There exist the following definitions of the concepts "growth" and "development." Growth is irreversible neoformation of the structure of a living body or the substance of its parts. Development is qualitative change of the components of an organism, in which existing forms or functions are transformed into others. An example of growth is extension of a branch owing to multiplication and enlargement of the cells making it up, while an example of development is formation of sprouts out of seeds upon germination. Growth and development cannot be delineated sharply from one another.

Research started by Charles Darwin on the nature of signals governing intercellular interaction in plants became one of the main directions in the science of plant physiology. Even today, however, these questions are far from completely answered. Let us examine some examples illustrating the nature of intercellular communication in plants.

Movement is one of the most readily observable manifestations of life even in plants, though it generally proceeds much more slowly in them than in animals. It is no accident that precisely this class of physiological phenomena served as the basis for the first hypotheses concerning the existence of growth substances. Movements are closely associated with the processes of growth and development; in contrast to these processes, however, movements may be governed by external (stimulatory) factors, light and gravity for example. They may also be reversible.

A typical example of movements occurring at a rate typical of plants would be growth movements elicited by nonuniform growth of the opposite sides of some organ in response to the action of a stimulus. This class of movements includes phototropic bending, which is distinctly observed, as an example, in oat coleoptyles. The tip of an oat sprout bends in the direction of a light source when it emerges above the surface of the ground, thus bringing the photosynthesizing organs closer to the light. The time from the beginning of the action of the stimulus to the beginning of the visible reaction is 25-60 minutes in this case. It has been found that such bending is the product of a difference in the rate of cell growth, primarily in length. Growth is inhibited on the illuminated side, and it is stimulated on the dark side. By shading different portions of the coleoptyle we can reveal that only its uppermost part (about 250 μ) is sensitive to the direction of illumination. By covering this portion with a foil hood we can prevent bending. The area of bending itself, in which nonuniform cell growth is observed, is located below the sensitive tip; moreover the nonuniformity in growth, which arises near the supersensitive area, gradually spreads downward toward the base at a rate equivalent to the rate of movement of nutrients along the coleoptyle. This pattern is also observed at the apex of the sunflower plant as well as in geotropic bending that occurs when plants orient themselves in a gravitational field.

Another typical example of the mutual influence exerted by parts of a plant on the growth process is the effect of apical dominance. It can be observed, for example, in a young spruce. Each year active vertical growth occurs only in the top shoot, while nearby lateral shoots grow much more slowly (almost in a horizontal direction). Were we to remove the apical shoot, one or several lateral shoots would begin to straighten out after a certain time, and one of the straightened shoots would assume the function of an apical shoot. From this moment on we observe the initial growth pattern once again. The effect of apical dominance can be easily explained if we assume that a certain inhibitory signal that blocks vertical growth of lateral shoots moves downward from the apical shoot (at the rate of flow of metabolites). This leads to formation of the typical crown of a young spruce promoting optimum development of the plant. The phenomenon of apical dominance is distinctly observed among a large number of plant species.

Investigation of flowering processes provides an even more interesting and visual idea of how chemical substances regulate plant growth and development by transmitting information necessary for regulation (this is the hormonal type of regulation). There are a number of events in growth and development which are regulated by the duration of daytime illumination--by day length. Formation of the flower bud is one such event. Depending on sprouting conditions, a number of species flower only when day length rises above a certain critical value (long-day plants); when this critical day length is not reached, most such plants assume a rosette form or grow a short stem. Short-day plants flower when day length is below a certain critical value. The stem of such plants forms independently of day length, but in long-day conditions they exhibit only swift vegetative growth. Concurrently there are a number of species in which the length of the photoperiod does not influence flowering. Examples of long-day plants are spring cereal grains in the moderate zone; spinach and beets; short-day plants include rice, millet, flax and soy.

It has been established that the leaf is the organ which registers day length and produces the controlling signal. This signal travels from the leaf to the point at which the flower forms. A number of original grafting experiments have demonstrated the existence and the chemical nature of the signal. If we graft one leaf of a short-day plant to a long-day plant, the latter would flower in a short day, one in which the flowering hormone could be formed only in the grafted leaf. The opposite experiment can also be performed--grafting the leaf of a long-day plant. We can cause both long-day and short-day plants to flower in the presence of unfavorable day length if we graft them to flowering plants that are neutral in relation to photoperiod . If we place an opaque hood over just one leaf of two short-day plants joined together by grafting and grown in long-day conditions, thus creating a short day for that leaf, both plants would flower. Thus the flowering stimulus (hormone) is the same for long- and short-day plants and for plants neutral to day length. Having a chemical nature, it is transported from the leaf, where it is formed, to the growth zone, in which the flower develops.

Extensive research on the ways plant cells, tissues and organs interact led to the notion that signals responsible for such a relationship are predominantly chemical in nature. Phytohormones are the principal endogenous (natural) plant growth hormones. Phytohormones are formed in the plant itself, and they participate in growth, in formation of new organs, in transition to flowering, in sexual differentiation of flowers, in aging of leaves, in transition to a dormant state and in emergence from it--in other words, in all phases of the vital activities of plants.

Formed in certain plant organs or tissues, phytohormones travel to other tissues or organs, determining and directing the nature of processes occurring within them. These substances ensure the functional integrity of the plant organism and the coordinated activity of all of its parts. As a rule the regulatory action of phytohormones is highly specific, and other factors influencing the plant cannot substitute for them.

Scientists now divide the known phytohormones into five groups: auxins, gibberellins, cytokinins, ethylene and abscisic acid. Establishment of the chemical structure of phytohormones led to attempts at finding substances exhibiting similar action among their structural analogues. A significant number of synthetic plant growth regulators and herbicides, which have enjoyed extensive application in practical plant growing, were discovered as a result. Most of them are either analogues of phytohormones in relation to their nature of action upon the plant, or they influence the hormone balance of plants.

We will attempt to briefly review the history of the discovery, study and application of the basic groups of phytohormones and synthetic plant growth regulators below.

Use of Plant Growth Regulators in Practical Plant Growing

Use of plant growth regulators in practical plant growing began a little more than 30 years ago. This direction was found to be highly promising in the very first stages of its development; however, it was only in the last few years that the sphere and volume of the application of plant growth regulators began to expand rapidly. Use of growth regulators (in addition to using chemical plant protection resources and fertilizers) is one of the most promising ways of raising agricultural productivity. As was indicated earlier, this method of regulating plant growth and development in the direction we require does of course have its limitations, which must not be forgotten. These limitations are primarily the product of the potentials of the plants themselves. For example an attempt to hasten growth of valuable woody species by using gibberellins was unsuccessful because such acceleration of growth was accompanied by deterioration of the quality of the wood. This is why one of the factors of successfully using plant growth regulators is thoughtful formulation of the purposes for which they are to be used, and significant progress has recently been observed in this area.

Propagation of plants by cuttings is a widespread technique, but in addition to plants which root readily, the cuttings of some plants root poorly or not at all. Such plants include the apple, pear, plum, cherry, peach, conifers, nut trees, many ornamental woody species and pink.

The rooting of the cuttings of such plants, when obtained from sufficiently young shoots, is significantly facilitated by first processing them in auxin solutions or dusts. Indolylbutyric and α-naphthylacetic acids are the most effective in this regard. Root formation stimulators are also used in the transplanting of seedlings, saplings and mature trees and shrubs. For this purpose their roots are submerged for 18-24 hours in an aqueous solution of indolylbutyric acid or α-naphthylacetic acid (5-10 mg/liter) prior to planting, and then the root zone is irrigated two or three times in the course of the entire period of growth.

Growth in the number of nitrogen fertilizers introduced into the soil, especially in zones characterized by abundant precipitation, is causing swift growth and lodging of cereal grains, which is reducing the yields and sharply increasing the losses of grain during harvesting. This problem is being solved by two methods--creation of highly productive short-stemmed varieties of cereal crops, and use of effective retardants. The most broadly employed retardant is chlorocholine chloride (CCC). Just in the USSR alone, millions of hectares of wheat and rye have been processed with this compound. Winter wheat displays the greatest sensitivity to the retardant, and spring wheat and winter rye exhibit somewhat lesser sensitivities; barley and oats are not very sensitive to CCC. Spraying plants with the preparation at the beginning of the most active stem growth at a consumption rate of 4 kg/ha produces the greatest impact. A preparation based on 2-chloroethylphosphonic acid--kampozan--was recently proposed for rye and oats. It is used at a dose of 1-4 kg/ha. The search for effective retardants for barley, rice and sunflower is continuing. Chlorocholine chloride was also found to be extremely effective in improving the planting quality of vegetables, which spread out owing to insufficient illumination when grown in a hothouse. Processing tomato plantations with 0.3-0.5 percent CCC solution makes the plants much more compact.

Alar was found to be a highly effective retardant in fruit growing. The spraying of young apple trees and other stone fruit crops with 0.2-0.5 percent Alar in June, 2 weeks after the end of flowering, inhibits shoot growth and stimulates flower budding. This effect persists for several years. Alar processing hastens the start of fruit bearing in young orchards, and it promotes formation of a compact tree crown making it possible to plant trees closer together. (Lakuill), an English horticulturalist, proposed an intensive orchard farming procedure using Alar, which came to be called the "meadow orchard" method. Apples are planted at a rate of 30,000-100,000 per hectare, and in the first year they are processed with Alar. In the second year the compact plants begin to bear fruit. After the harvest the plants are cut down to stumps, and aftergrowing shoots provide for the next 2-year cycle. Maleic hydrazide is used in ornamental horticulture to inhibit growth of lawns and living fences. It is introduced as a spray in spring and in the beginning of summer.

A broad spectrum of plant growth regulators has been proposed and is now being used to control flowering and fruiting. Substances produced from ethylene hold a dominant position among them--primarily 2-chloroethylphosphonic acid. Its main use is to promote early synchronous maturation of fruits and establishment of their abscission layer. This permits organization of mechanical harvesting of early fruits on a compressed schedule. An example would be tomatoes, the fruits of which mature nonuniformly when etrel is not used: The plants must be picked by hand three to five times with an interval of several days, and the fruits often fail to mature at all in central strips. Etrel reduces outlays of manual labor and losses of the product. A similar pattern is observed in the harvesting of berries and fruit trees. Plants are treated with solutions of etrel (250-750 mg/liter) 5-14 days prior to the intended harvest day. Ethylene and etrel are also used to hasten maturation of harvested fruit. One practically valuable property of etrel is its ability to stimulate synchronous flowering in pineapple and change of the sex ratio of monoecious plants--cucumbers for example. In addition to ethylene derivatives, auxins are used to regulate fruiting. Tomatoes lose their ovaries and form small fruits (especially when the weather is poor during flowering), which is connected with a shortage of endogenous auxins. Spraying of plants with auxin solutions promotes better fruiting and production of partially or completely seedless fruits. These results are achieved with 4-chlorophenoxyacetic acid (parafen) in hothouse conditions and β-naphthoxyacetic acid in the field at a concentration of 40-50 mg/liter. Year-round citrus production is achieved in California by preharvest processing of lemons and oranges with a 0.0008 percent solution of 2,4-dichlorophenoxyacetic acid, as a result of which they remain green or greenish on the trees for a long period of time.

Processing seedless grape varieties with gibberellin is highly effective. A shortage of endogenous gibberellins causes poor fruit development in these varieties. Spraying of flowering plants with gibberellin solution (at a rate of 30 gm/ha) causes loosening of the bunches, enlargement of the fruits and, consequently, a 50-100 percent increase in yield.

One of the promising areas for use of growth regulators is control of dormancy in plants. Thus potato yields can be obtained twice a year in the country's southern regions. But it is practically impossible to preserve tubers from last year's harvest until the moment of replanting, while freshly harvested tubers of the first harvest assume a dormant state. By immersing them for 30 minutes in a solution containing 1 mg/liter gibberellin and 20 gm/liter thiourea we can interrupt dormancy and cause the tubers to begin sprouting in 4 or 5 days. Dormancy of the seeds of some plants may be interrupted with etrel. Growth regulators are effective against weeds that produce seeds which survive in soil for long periods of time without germinating, thus remaining insensitive to herbicides. For example introduction of etrel into soil at doses of 0.01-1.00 kg/ha stimulates synchronous germination of the seeds of *Striga*, a pest weed with seeds that remain dormant for the most part. Germinated seeds are easily killed with herbicides. Unfortunately, the known growth regulators cannot interrupt dormancy of all weed seeds.

Lengthening dormancy in vegetables and fruit is a more important problem connected with postharvest storage of agricultural products. Stored potato tubers begin sprouting as early as in March and April, and eyes can be removed only by hand. In 1939 the American scientist (Getri) established that the methyl ether of α-naphthylacetic acid prevents sprouting of potatoes. This preparation was studied in the USSR, and a dust containing 3.5 percent methyl ether of α-naphthylacetic acid was placed into production for the processing of potato tubers. A preparation which has come to be called M-1 is applied to tubers as a dust just prior to storage (at a rate of 3 kg per ton). Tekhnatsen (1,2,4,5-tetrachloro-3-nitrobenzene) and chlorpropham (isoproyl-3--chlorophenylcarbamate) are used extensively for these purposes abroad. The effectiveness of using maleic hydrazide to prevent sprouting of potatoes has been studied. Potato tops are sprayed with this regulator at a dose of 2.5 kg/ha 12-15 days prior to harvesting. Maleic hydrazide penetrates and accumulates in the tubers, where it subsequently inhibits sprouting.

An even more important problem is that of reducing losses of sugar during storage of sugar beet roots after harvesting. They are normally stored for several months in the open in piles (clamps) until processing. In 1 day, a ton of sugar beet roots lose about 200 gm of their sucrose due to respiration. These losses can be reduced by about half by spraying the plants with maleic hydrazide 12-15 days before harvesting at a dose of 2.5 kg/ha.

The active search for new synthetic growth regulators that can solve this problem is continuing today.

It should be considered that losses caused by development of fungal diseases--rots and molds--are also extremely great in stored tubers and roots. This predetermines the need for integrated use of growth regulators and preparations suppressing development of fungi (fungicides) or creation of active substances exhibiting multiple action.

There is significant practical interest in finding and using substances that intensify and control transport of plant metabolites. It is believed that at the moment of harvesting, a significant quantity of carbohydrates remain in the leaves of sugar cane and sugar beets, and that the sugar yield could be increased by 5-10 percent by intensifying drainage of these carbohydrates from the leaves. This result can in fact be achieved by processing sugar cane with glyphosine at a dose of 2.0-6.4 kg/ha prior to harvesting. The possibility of treating sugar cane with the preparation, referred to here as "dizugran," is now being studied.

Research on the problem of obtaining latex from natural rubber--hevea--led to establishment of an important fact. Ethylene prevents fast coagulation of latex in air, owing to which cuts in tree bark function longer, and the total yield increases significantly. An attempt to replace ethylene by etrel produced a remarkable result. Latex production increases by several orders of magnitude in just 10 days after processing, and then it remains 1.5-2 times higher than in unprocessed trees for 10 months. Today this procedure is broadly employed in plantations, producing a significant economic impact.

Closely related to the problem of redistributing plant metabolites is the as yet unsolved problem of using growth regulators to alter the ratio of plant parts that are and are not used by man.

Despite discovery of such an effective preparation as DROPP, the problem of supplying defoliants to agriculture and especially to cotton growing has not been conclusively solved. It has been found that considering its high price, DROPP is insufficiently effective in the more-northerly cotton growing zones, for example in the USSR. This is why researchers are continuing their hunt for new defoliants.

Among the most important problems of plant growing, solution of which requires a search for new plant growth and development regulators, we should first of all point out the need for raising the resistance of highly productive varieties to unfavorable germination conditions such as low and high temperature, inadequate moisture and soil salinity. As a rule when plants are selected for higher productivity, their resistance to unfavorable conditions decreases. This problem is especially acute in our country, where the larger part of the cultivated land is within the "risky farming" zone, and fluctuations in the gross grain harvest attain 40 percent of the average harvest owing to unfavorable weather conditions. Researchers have noted many times that various growth regulators raise the resistance of plants to some extent. This question was studied especially extensively in connection with the use of the retardant chlorocholine chloride. In response to this preparation the structure of the plant acquires a number of unique features that raise its resistance to drought and low temperatures. They include more vigorous development of the root system, short stature and, in the case of seeds, deepening of the tillering node in cereal grasses (by 0.5-2 cm). However, this technique cannot solve the problem of raising the drought resistance of cereal grasses.

Closely related to the problem of protecting plants from unfavorable germination conditions is the task of raising the resistance of plants to infection by pathogenic microorganisms. It has been noted that many synthetic growth regulators, chlorocholine chloride in particular, make plants more resistant to diseases by reducing the permeability of cell walls and stimulating the work of the plant's defense systems. Also of interest are compounds exhibiting concurrent growth-regulating and fungicidal activity. For example a preparation named "tachigeren" (3-oxy-5-methylisoxazole), developed in Japan, forms two conjugates with glucosides in plants, one of which has growth-regulating and the other of which has fungicidal activity.

Great hopes are being laid upon plant growth and development regulators in relation to raising the effectiveness of photosynthesis. Less than 1 percent of the solar energy reaching the leaves is transformed photosynthetically into chemical energy. The effectiveness of this process is limited in the field by the plant's capability for fixing carbon dioxide. As an example 1 hectare of corn must assimilate 32,000 kg of CO_2 during the period of growth, which means it must process more than 100,000 tons of air. The productivity of this process may be increased by altering the form of the above-ground part of the plant in such a way as to improve air circulation in the field, and by changing the degree of dilation of the stomates, through which CO_2 enters the leaves.

It should be noted in the conclusion of this chapter that most substances used as plant growth regulators have extremely low toxicity in relation to man and animals. As a rule their toxicity in relation to insects, fish and plants themselves is low as well. Despite the fact that the cost of their production is rather high, the economic impact enjoyed from using growth regulators in plant growing is greater than that of using pesticides and fertilizers. The profit from using just etrel to raise latex yield more than compensates for the outlays on the research on growth regulators being conducted in the whole world.

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CSO: 1841/300

UDC 628.162

CHLORINATING HERBICIDES OF SYM-TRIAZINE GROUP IN AQUEOUS SOLUTIONS

Kiev KHIMIYA I TEKHNOLOGIYA VODY in Russian Vol 4, No 3, May-Jun 82 (manuscript received 26 May 81) pp 252-254

TARAN, P. N. and KAS'YANCHUK, R. S., Institute of Colloid Chemistry and Water Chemistry imeni A. V. Dymanskiy, UkSSR Academy of Sciences, Kiev

[Abstract] For their selective action and safety for cultivated plants, the title herbicides are widely used, but as algicides they pose a threat due to their stability. The authors sought ways to render them harmless, after such use, with active chlorine as the basis of a technical process for both natural and artificial sewage reservoirs. Experimental data for various models showed that treating symazine for 60 minutes at pH ranging from 2.5-10 and molar ratios of symazine and chlorine of 1:1 to 1;20 had no effect on symazine levels. The addition of chlorine water to a symazine solution did cause a medicinal ordor suggesting the formation of N-chlorine derivatives. Further tests showed that this reaction occurred only in an acid medium. When a 20-molar excess of chlorine is used, at 19°C, organoleptically active N-chlorine derivatives formed at a rate depending on pH and the concentrations of the reactive agents. Since the derivative was stable even in the presence of large amounts of chlorine, the conclusions was that chlorination could not be recommended for removing sym-triazine from water. Figure 1; references 6 (Russian).
[287-12131]

UDC 632.95

MORE EFFECTIVE USE OF PESTICIDES

Moscow KHIMIYA V SEL'SKOM KHOZYAYSTVE in Russian No 6, Jun 82 pp 4-6

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[Abstract] Among pesticides used in the Kazakh SSR, 50% of the 200,000 ton total are herbicides, 30% are insectoacaricides, 9% disinfectants, more than

7% fungicides and 3% defoliants and desiccants. The most common are organic chlorine and phosphorus compounds, derivatives of carbamic and chlorophenoxyacetic acids and sym-triazines. Preparations containing mercury have been cut back, and among fungicides a significant place has gone to derivatives of dithiocarbamic acid and inorganic copper and sulfur compounds. Pesticide use has allowed Kazakhstan to produce from 9 to 33% of total Soviet production of particular crops, and to affect economies in labor and crop losses. Chemical means of plant protection are to be used even more broadly in the 11th Five-Year Plan. For more effective use, better mapping of pest distribution and integration of control systems must be achieved. Comprehensive field research is under way. Industrial technology must be brought to the production of sugar beets, cotton, soy beans, sunflowers, potatoes and other crops.
[297-12131]

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FUNGICIDE ACTION OF PESTICIDES AND PLANT GROWTH REGULATORS (ANALYTICAL REVIEW)

Moscow KHIMIYA V SEL'SKOM KHOZYAYSTVE in Russian No 6, Jun 82 pp 29-31

ANDREYEVA, Ye. I., doctor of agricultural sciences and KONDRAT'YEV, Yu. A., doctor of chemical sciences, All-Union Scientific Research Institute for Chemical Means of Plant Protection

[Abstract] Recent research has shown that application of chemical means of plant protection has side effects, such as the effects of fungicides on soil microflora, those of growth regulators and herbicides on pathogens and soil microflora, and the influence of insecticides on pathogens. For example, 2,4-D herbicides have been observed to increase Sitobium avenae on oats, Phopalosiphum padi and Ph. maydis on corn, and Acyrthosiphon Pisum on legumes. 2,4-D also suppresses soil bacteria and actinomyces. Triazine herbicides reduced weed infestation in corn by 5-35%, but at the same time the incidence of low smut rose. Some herbicides had the opposite effect from expectations, as the increase of Ihielaviopsis basicela, after chlorambene application, showed. Use of symazine and igranso on spring and winter wheat at first suppressed, but later apparently stimulated, the infestation of powdery mildew. Bazagran and avadex were found to depress Fusarium fungi on cultures when the dose was 1000 mg/l. Among other side effects, fungicides were found to destroy beneficial microorganisms, while insecticides inhibited pathogen development and, in the case of organic phosphorus compounds, had some effect on verticillium wilt. References 40: 1 Russian, 1 Polish, 38 Western.
[297-12131]

UDC 632.954

USING ERADICANE AND GLYPHOSATE IN COTTON CROP ROTATION

Moscow KHIMIYA V SEL'SKOM KHOZYAYSTVE in Russian No 6, Jun 82 pp 36-38

KAS'YANENKO, N. A., PAKHOMOVA, D. M. and PARSHUTIN, S. M., All-Union Scientific Research Institute for Chemical Means of Plant Protection

[Abstract] Dalapon is commonly used to combat perennial grass weeds in cotton plantings, but its effectiveness on wire grass and beardgrass is of insufficient duration. In 1977-1979 the authors studied the effect of eradicane and glyphosate on these weeds, as well as their aftereffects on cotton production. Respective applications as recommended for the Soviet Union, of 3.2-6.4 kg/ha of eradicane and 2-4 kg/ha of glyphosate, were applied before corn in the crop rotation since they are toxic for cotton in these dosages. Cotton was planted the following year. The herbicides contributed to suppressing the target weeds and brought significantly higher corn yields. Both herbicides were found to remain in the soil and not leach out. Results indicated that eradicane should be applied prior to corn in the crop rotation, while glyphosate should be applied on the growing target weeds after cotton picking in the rotation corn-hemp-melons-clover of the last growing year.
[297-12131]

UDC 632.954:631.432:631.436

HERBICIDAL EFFECTIVENESS OF PYCLORAM AS FUNCTION OF ITS SOIL ADSORPTION AND DETOXICATION UNDER VARIOUS HYDROTHERMAL CONDITIONS

Moscow AGROKHIMIYA in Russian No 6, Jun 82
(manuscript received 15 Jul 81) pp 101-106

SPIRIDONOV, Yu. Ya., SHESTAKOV, V. G., BONDAREV, V. S., MATVEYEV, Yu. M., SPIRIDONOVA, G. S. and CHICHERINA, L. A., All-Union Scientific Research Institute of Phytopathology, Moscow Oblast

[Abstract] Studies were conducted on the effects of adsorption of pycloram to soil particles on its detoxication and herbicidal effects at 25 and 35°C and relative humidities of 60 and 90%. The results showed that the herbicidal activity against cocklebur was essentially determined by the degree of adsorption to soil particle, which was largely predicated on the hydrothermal conditions of the dernovo-podzolic soil. The actual herbicidal activity was less affected by the hydrothermal conditions than is usually the case with more stable herbicides. The actual duration of the biological activity did not exceed 14 days, although pycloram persisted in the soil for a prolonged period of time as indicated by half-life figures of 134-239 days. Figures 2; references 15: 5 Russian, 10 Western.
[323-12172]

UDC 632.954

EFFECTS OF ARYLAMIDE HERBICIDES ON SOIL ENZYMATIC ACTIVITY

Moscow AGROKHIMIYA in Russian No 6, Jun 82 pp 125-133

GALIULIN, R. V.

[Abstract] The enzymatic activity found in soil can be used to monitor the level of soil contamination with xenobiotics, including the arylamide herbicides. A review is presented on effects of various herbicides on such activity and on the need for proper standardization which would take into consideration the type of enzymatic activity measured, soil type, and the chemical nature of the herbicide employed. References 55: 3 Czech, 13 Western, 39 Russian.
[323-12172]

PETROLEUM PROCESSING TECHNOLOGY

UDC 66.094.37-911.4:661.715.25/.26

LIQUID PHASE OXIDATION OF COMPONENTS OF CASING-HEAD GASOLINE

Moscow KHIMICHESKAYA PROMYSHLENNOST' in Russian No 6, Jun 82 pp 326-328

DAYAN, V. M., ASTVATSATRYAN, S. A., KUSHINA, I. D., PYZH, M. I.,
PAZDERSKIY, Yu. A., BRYUKHOVETSKIY, V. A. and LEVUSH, S. S.

[Abstract] Oxidation of casing-head gasoline is the only industrial method for obtaining propionic acid and the basic method for obtaining formic acid used in the USSR. Seeking higher yields of the low carboxylic acids, the authors studied oxidation of various classes of hydrocarbons in the petroleum fraction under conditions analogous to those at the Yerevan production association involved in producing carboxylic acids. Various C_5-C_8 hydrocarbons were studied at 155-195°C in 5 MPA of pressure. Isopentane, isooctane and cyclohexane were also studied. Waste gases were analyzed by chromatography for CO, CO_2 and hydrocarbons, while the oxidate was tested for acid content chemically and by chromatography for formic, acetic, propionic and butyric acids, acetone and water. Data indicate that yields of acetic acid from oxidation of n-hexane are significantly greater than production of formic and propionic acids, and they increase with deeper conversion of n-hexane. Increased temperature speeds conversion while also increasing the amount of pitch produced. The chief intermediate product is acetone, accounting for as much as 60% of the light by-products of oxidation. Oxidation of isopentane reduced production of propionic acid and increased acetone yield; acetic and formic acid quantities also fell. Cyclohexane oxidation produced various dicarboxylic acids. Figures 2; references 9: 7 Russian, 2 Western.
[288-12131]

UDC 621.892.86:620.197.3(088.8)

PROTECTIVE ADDITIVES BASED ON MICROBIAL FATS FOR LUBRICANTS

Moscow KHIMIYA I TEKHNOLOGIYA TOPLIV I MASEL in Russian No 7, Jul 82 pp 19-20

SALENKO, V. I., KAZANTSEV, Yu. Ye. and FEDOROV, V. V., All-Union
Scientific Research Institute for Protein Synthesis

[Abstract] Current multi-functional protective additives for lubricants should contain phosphorus, amines, sulfur, and also carboxyl, hydroxyl and complex ester groups. Preparation of such additives involves multi-stage production and mixing. The authors' studies indicate that microbial fats contain essentially all the attributes desired. Lipid extracts from yeasts are recommended as additives on the basis of their results. The lipid extract of Candida guilliermondii, used as an example, contains non-saponified substances, free aliphatic acids, glycerides and phospholipids, each of which is discussed. The corrosion resistance of the phospholipids surpassed currently-used conserving additives in many parameters, and had no negative impact on physicochemical properties. Thus neutralized microbe fats are recommended to replace expensive additives that must be produced by complicated organic synthesis. References 10: 9 Russian, 1 English.
[298-12131]

UDC 665.637.6:665.663.4

OBTAINING LOW-CONGEALING OILS AND PARAFFINS BY CARBAMIDE DEPARAFFINIZATION METHOD

Moscow KHIMIYA I TEKHNOLOGIYA TOPLIV I MASEL in Russian No 7, Jul 82 pp 8-9

KALAMBET, I. A. and DORODNOVA, V. S., Grozno Scientific Research Institute

[Abstract] Ethane cooling is required to obtain oils with congealing points lower than 15-20°C. Thus a process of carbamide deparaffinization that would be relatively simple and would not require special cooling equipment was deemed desirable. The authors selected filtrates from an oil separating device after basic solid paraffins had been removed. They were subjected to hydropurification with an aluminum-cobalt-molybdenum catalyst at 4 MPa pressure, 320°C, feed of 1.5 c^{-1} and hydrogen-containing gas compressed to 500 m^3/m^3. Results showed that the initial mixed hydrocarbon filtrate was deparaffinized under these conditions to produce an oil that congealed on the average at temperatures 2-3° lower than controls. A benzine fraction at 80-120°C was used as the solvent and methanol served as the activator. Using distillates from Stavropol crude oil, it was possible to obtain oils that congealed at -30°C. References 4 (Russian).
[298-12131]

POLYMERS AND POLYMERIZATION

UDC 678.742.2.033:66.095.262

ELECTRICALLY CONDUCTIVE POLYETHYLENE COMPOSITIONS PRODUCED BY POLYMERIZATIONAL FILLING

Moscow PLASTICHESKIYE MASSY in Russian No 7, Jul 82 pp 6-7

BAULIN, A. A., KRASNOSHCHEKOV, A. I., DEYANOVA, A. S. and VASILENOK, Yu. I.

[Abstract] Production of containers for inflammable and explosive substances usually involves electrically conductive polymers in which metal powders and carbon fillers are dispersed. Many mineral fillers cannot be used to produce conductive polyolefin compositions by polymerizational filling. The authors attempted to perform the title production with furnace black and fibrous technical carbon. The fillers were subjected to vacuum to about 10 Pa residual pressure, then heated at 200°C for 4 hours. Next they were processed with titanium tetrachloride in n-heptane at 70-80°C for 2 hours with constant mixing. After completion of polymerization, the products were rinsed with n-heptane and dried. Results indicated that chemical structure was the chief determinant of polymerizational effectiveness. The chemical composition was characterized by carbonyl, carboxyl and hydroxyl groups containing oxygen, which apparently controlled the bond of fillers with titanium tetrachloride. Groups that inhibit polymerization were also present on the surfaces of the carbon fillers. Polyethylene compositions obtained by this method had high physicomechanical qualities of durability and conductivity. References 10: 9 Russian, 1 English.
[302-12131]

UDC 678.686.028

STRENGTHENING EPOXY OLIGOMERS

Moscow PLASTICHESKIYE MASSY in Russian No 7, Jul 82 pp 32-33

LABINSKAYA, N. V., SERDYUK, L. Ye., TROFIMENKO, N. F. and MOSHCHINSKAYA, N. K.

[Abstract] Earlier work on effective accelerators for strengthening epoxy oligomers led to fiberglass products for electrotechnical uses. The authors

studied methods for strengthening using acid anhydrides with new acclerators such as $C_6H_5CH_2(C_2H_5)_3NCl \cdot 1.5ZnCl_2$ and $C_6H_5CH_2(C_2H_5)_3NCl \cdot 1.5NaCl$. The accelerators tested had varying effects depending on the epoxy oligomer being tested. For example, with all oligomers but "ED-20," the exothermal reaction began at 90°, while with ED-20 it began at 130°C. The least temperature increase came with the cycloaliphatic epoxy oligomer UP-632. Length of reaction also varied. Data of electrokinetic studies confirmed these results. Both methods enable determination of optimal composition of the material being hardened, the length and temperature of strengthening. The process was shortened for most epoxy oligmers by use of the test accelerators, while technical parameters were preserved. Figures 2; references 7 (Russian).
[302-12131]

RADIATION CHEMISTRY

UDC 621.639

RADIOCHEMISTRY OF ATOMIC EXPLOSIONS

Leningrad RADIOKHIMIYA in Russian Vol 24, No 3, May-Jun 82
(manuscript received 20 Dec 81) pp 277-286

KRIVOKHATSKIY, A. S.

[Abstract] Noting that agreements on underground nuclear explosions do not exclude ones conducted for peaceful purposes and citing other provisions of those agreements, the author reviews data collected from such blasts. He defines radiochemistry both in terms of radionuclides and their behavior and in terms of chemical transformations resulting from nuclear explosions in rocks, liquids and gases. Physicochemical aspects of each explosion must be monitored to protect the environment and control the products of a project. The latter includes acquisition and processing of radioactive materials to obtain synthetic isotopes and techniques for deactivizing other materials before their use. The use of atomic explosions in obtaining mineral ores through blasts which form macrocomponents of useful elements that could not otherwise be obtained is discussed. Geological structures, the migration of radionuclides with ground water and resultant leaching must be taken into account in such projects. Uses of analytical radiochemistry for dating and for environmental protection are summarized. Chemical processing of products of atomic explosions involves obtaining ores such as copper and uranium through underground leaching without disturbing agricultural lands. US and Soviet projects are cited. Other projects have been directed toward producing californium 252 or fermium 257 from natural uranium, at much lower costs, or producing electrical energy through use of ^{3}H explosions (a US project). References 18: 15 Russian, 3 Western.
[291-12131]

UDC 542.61

EXTRACTING PENTAVALENT AMERICIUM FROM SOLUTIONS OF POTASSIUM PHOSPHOTUNGSTATE

Leningrad RADIOKHIMIYA in Russian Vol 24, No 3, May-Jun 82
(manuscript received 15 Aug 81) pp 303-307

MOLOCHNIKOVA, N. P., FRENKEL', V. Ya., MYASOYEDOV, B. F. and
LEBEDEV, I. A.

[Abstract] Study of extraction properties of Am(V) contributes to developing methods for extracting it from other actinoids. Previously the authors showed its extraction in quantity using 1-phenyl-3-methyl-4-benzoylpyrazolone-5 (PMBP) in isobutanol at pH=4.5-5.5, but this process also produced Am(III). The present study is devoted to extracting americium in various oxidation states, as well as other actinoids, from solutions containing potassium phosphotungstate, in order to develop methods for separating them. Methods for obtaining the necessary reagents and for carrying out the process are summarized. Ammonium persulfate, which is essential to stabilize Am at higher degrees of oxidation, did not affect complex formation of trivalent actinoids with heteropolyanions. Am(V) was extracted in quantity by a 0.05 mol/l solution of PMBP in isobutanol from solutions with pH=4.5-5.5, and the presence of heteropolytungstates did not affect Am(V) extraction. With heating, the solution produced Am(VI). The addition of an acetate buffer caused thinning but the Am(VI) remained. It was also possible to extract cirium using this method. Figures 4; references 10: 9 Russian, 1 French.
[291-12131]

UDC 546.799.3

SEPARATING OXALATE AMERICIUM (V) COMPOUNDS FROM SOLUTION

Leningrad RADIOKHIMIYA in Russian Vol 24, No 3, May-Jun 82
(manuscript received 20 Dec 81) pp 319-321

ZUBAREV, V. G. and KROT, N. N.

[Abstract] The reaction of Am(V) with oxalate ions has received little attention. The authors sought to obtain complex Am(V) oxalates in solid state using Am-243 isotopes with less than 30% Am-241. Different results were obtained when Am(V) was precipitated using ammonia, as the amount of ammonia correlated directly with the Am(V) concentration in the solution, and when KOH was used in a slightly acid Am(V) solution, as increasing the KOH content brought a decrease in Am(V) residual concentrations. Physical characteristics also changed with heating or clarification. Complex Am(V) oxalates were obtained by precipitation with hydroxides of the desired alkaline metal, obtaining, for example $\mathrm{CsAmO_2C_2O_4 \cdot \underline{x}H_2O}$ and $\mathrm{KAmO_2C_2O_4 \cdot \underline{x}H_2O}$. Powder x-radiation showed that salts of Am(V) and Np(V) were non-isomorphic.

All the compounds produced decomposed readily in their own alpha-radiation. Compounds synthesized in the evening had transformed to carbonates of trivalent americium and the alkaline metal by morning. Figure 1; references 4 (Russian).
[291-12131]

UDC 531.1:546.799.4:542.61

OXIDIZING PU(III) IN EMULSION OF 30% TRIBUTYLPHOSPHATE-AQUEOUS SOLUTION OF NITRIC ACID CONTAINING HYDRAZINE

Leningrad RADIOKHIMIYA in Russian Vol 24, No 3, May-Jun 82
(manuscript received 20 Jun 81) pp 331-334

MARCHENKO, V. I., REVYAKIN, V. V., GITKOVICH, Ye. S. and KORABLEVA, N. A.

[Abstract] Previous studies with the title emulsion led the authors to test a wider range of experimental conditions to observe the behavior of trivalent plutonium. Tributylphosphate (TBP) in n-dodecane was mixed with an aqueous solution of nitric acid containing Pu(III) and hydrazine. At intervals aliquots of each phase were removed to determine Pu concentrations. Nitric acid concentrations in the organic phase were calculated on the basis of its concentration in the aqueous phase and the value of an HNO_3 extraction constant. Results showed that significant oxidation of Pu(III) began at $[HNO_3] \geq 1.5$ mol/l at 32°C and accelerated as acidity was increased. All tests showed a distribution of Pu(IV) that indicated non-reversible oxidation of Pu(III). Oxidizers of Pu(III) in a two-phase system can be nitric or nitrous acid or nitrogen oxides, as well as atmospheric oxygen. Tests using the title emulsion in a helium medium showed that Pu(III) oxidizes to a tetravalent state somewhat more slowly under these conditions than in normal air and, apparently, atmospheric oxygen does not play a determining role in the process. Thus, the oxidizer is the nitrous acid or nitrogen oxide present in TBP. Figures 4; references 3 (English).
[291-12131]

UDC 546.799.3

PREPARING NEPTUNYL AND NEPTUNOYL URANATES

Leningrad RADIOKHIMIYA in Russian Vol 24, No 3, May-Jun 82
(manuscript received 15 Apr 81) pp 343-350

CHAYKHORSKIY, A. A. and LEYKINA, E. V.

[Abstract] Attempting to obtain mixed actinoid salts, the authors sought to synthesize neptunyluranate directly by contact of NpO_2^{2+} and UO_4^{2-} in solution

without hydrolysis as they had previously synthesized uranyluranate (reported in Soviet patent 722041). The zone of hydrolysis of the neptunium and uranium salts was evaluated by determining the pH dependency on relative concentrations. Concurrently, they sought to obtain a neptunoyluranate compound. Procedures are described for obtaining $NpO_2(NO_3)_2 \cdot nH_2O$ and analogous uranium salts, $NpO_2UO_4 \cdot nH_2O$, for recording absorption spectra and for studying reactions of NpO_2^+ ions with potassium uranate. Attempted synthesis of neptunoyluranate failed. Results showed that there was a 1:1 ratio between NpO_2^{2+} and UO_2^{2+} and the precipitate contained no potassium ions. The failed attempt to produce $(NpO_2)_2UO_4 \cdot nH_2O$ showed that NpO_2^+ ions catalyze the formation of H_2UO_4 from UO_3 and water and contribute to forming a supersaturated H_2UO_4 solution, from which $H_2UO_4(UO_3 \cdot H_2O)$ precipitated overnight. Also, new absorption bands for NpO_2^+ ions were found in the infrared area during the assessment of these experiments. Figures 6; references 8: 2 Russian, 6 Western.
[291-12131]

UDC 541.28:547.1'3

USING NUCLEAR CHEMICAL METHOD FOR SYNTHESIZING UNKNOWN ORGANIC ONIUM COMPOUNDS

Leningrad RADIOKHIMIYA in Russian Vol 24, No 3, May-Jun 82
(manuscript received 28 Oct 81) pp 394-396

NEFEDOV, V. D., TOROPOVA, M. A., SHCHEPINA, N. Ye., AVRORIN, V. V. and ZHURAVLEV, V. Ye.

[Abstract] While considerable research has been done on organic onium derivatives, a number of compounds, including ones with halogens other than iodine, have not been produced. The authors applied the nuclear chemical method they previously proposed (Soviet patents) in synthesizing tetraphenylammonium and diphenylfluoronium compounds. The method involves directed ion-molecular reactions of tritium-treated phenyl cations obtained in the beta-decomposition of tritium in the framework of tritium-treated benzene with phenyl derivatives of the elements being studied. Ion-molecular reactions were conducted in sealed ampules containing the reactive mass of treated benzene (the phenyl-cation source), phenyl derivatives of nitrogen and fluorine as substrates, and salts of inorganic KBF_4 or KI. Thin layer chromatography was used to identify the onium compounds obtained. Low yields in earlier tests of the derivative of tetraphenylammonium were apparently due to severe spatial difficulties; these difficulties were reduced in the present method by replacing phenyl groups with methyl groups, and much improved yields resulted. Evidence from chromatography confirms the identical molecular structures of the treated onium derivatives obtained and corresponding onium compounds of analogous phosphorus and bromine. References 10: 9 Russian, 1 English.
[291-12131]

UDC 678.5:537.226:537.311:621:039.073

RADIATION ELECTRICAL CONDUCTIVITY OF ORGANIC DIELECTRICS DURING PULSED GAMMA-NEUTRON RADIATION

Moscow PLASTICHESKIYE MASSY in Russian No 7, Jul 82 pp 20-22

MAKEYEV, S. N. and FILATOV, N. I.

[Abstract] The widespread use of solid organic dielectrics in atomic technology promotes the study of changes in electrophysical properties of isolation materials when affected by various types of radiation, including the title form, which has received little attention. Analysis of experimental and theoretical data show that temporary and permanent radiation damage occurs to electric and other parameters. The latter occur during constant radiation, but not during pulsed radiation. The authors studied the title conductivity of high and low pressure polyethylene, polycarbonate, polytetrafluoroethylene, polyethyleneterephthalate, polyacrylate DV, polyamide P-68 and other dielectrics. High pressure polyethylene results showed that radiation electrical conductivity did not depend on electrode material or the means of application. Experimental study of ionizational currents in dielectrics during pulsed radiation, in dependence on external voltage, where conducted at constant power of the absorbed radiation dose. Increasing the strength of the electrical field together pulsed radiation did not lead to penetration of film polymer dielectrics. Oscillogram analysis showed that radiation electrical conductivity under these conditions did not depend on the magnitude and polarity of external voltage. Absolute REC values for each dielectric depended on the ratio between gamma and neutron components, which is clarified by the contribution of the neutron component, and ranges from 86% for low-pressure polyethylene to only 4% for polyethyleneterephthalate. In neutron radiation, ionization is dependent on the effect of heavy charged particles. References 7: 5 Russian, 2 Western.
[302-12131]

UDC 678.744.32-139.01

EFFECT OF COMONOMER NATURE ON PROPERTIES OF ACRYLATE RUBBERS

Moscow KAUCHUK I REZINA in Russian No 7, Jul 82
(manuscript received 5 Nov 81) pp 4-6

SUVOROVA, E. A., FOMICHEVA, M. M. and GRINBLAT, M. P., All-Union
Scientific Research Institute of Synthetic Rubbers imeni S. V. Lebedev

[Abstract] The behavior of resins based on butylacrylate rubbers depends on the nature of the second comonomer as well as on the type of the specially introduced monomer responsible for the vulcanization reaction. The authors studied acrylic acid nitrite (NAA) and ethoxyethylacrylate (EOEA) as a second comonomers. The vulcanizing system was potassium stearate combined with sulfur. With EOEA the time needed for achieving optimal resin properties was shortened greatly. The vulcanized rubbers had reduced durability during stretching and relative residual lengthening, improved elasticity at room temperature and a somewhat greater swelling tendency in isooctane-toluene compared to rubbers containing NAA. Depending of the nature of the reactive group responsible for vulcanization, durability and rebound increased for the resins at various temperatures. The effects of the two comonomers on the kinetics of vulcanized system formation was evaluated on the basis of changes in a balanced module at 100°C in relation to length of vulcanization. Results showed that the resin with EOEA had 24% greater changes than that with NAA. The resin with EOEA was judged to have less thermal resistance. Replacing NAA with EOEA in copolymers with butyl rubber should improve cold resistance and speed up vulcanization, due to increased thickness in the vulcanizing matrix when ethoxy groups are involved in the vulcanizing process. No variations were attributed to use of different reactive groups. Figures 4; references 5: 2 Russian, 3 Western.
[292-12131]

UDC 678.074:546.16

DETERMINING GLOBULAR FRACTION CONTENT IN FLUORORUBBERS

Moscow KAUCHUK I REZINA in Russian No 7, Jul 82
(manuscript received 22 Jun 81) pp 6-7

YAKOVLEVA, T. V., DONTSOV, A. A., NOVITSKAYA, S. P. and BUKANOV, A. M., Scientific Research Institute for Rubber Production

[Abstract] Soviet copolymers of vinylidene fluoride and fluororubbers have a durable supermolecular structure which, however, breaks down as a result of thermomechanical action. They contain a globular fraction and a random-structured fraction. The globules provide good durability as fillers, but reduce elasticity and hamper processing. Electron microscopy revealed that the globules were polydispersed and had diameters from 150 nm to 30-40 nm, depending on the precise systems examined. They were highly durable during storage and processing. Further studies showed that in acetone they swelled to 170 nm diameter. To separate them from non-globular particles, the authors employed an ultracentifuge. The globular fraction could be separated only at speeds above 32,000 rpm. The SKF-26 copolymer was found to have the largest globular fraction, and SKF-32 had the smallest. Determining molecular mass features of fluororubbers required evaluation of the content of the globular fraction and the molecular mass difference of the random-structured portion; these are mutually supplementary parameters.
Figures 2; references 6: 5 Russian, 1 English.
[292-12131]

UDC 678.06:621-762:533:6

EFFECT OF TEMPERATURE OF AIR FLOW ON RESIN EROSION WEAR

Moscow KAUCHUK I REZINA in Russian No 7, Jul 82
(manuscript received 9 Jun 81) pp 12-13

KHOROL'SKIY, M. S. and GORELIK, B. M., Far East Branch, Scientific Research Institute for Rubber Production; Scientific Research Institute for Rubber Production

[Abstract] In operation of rubber-metallic valves, the sealing element is subjected to erosion due to air flow and impact loads. The damage caused is related to temperature level. The authors studied this phenomenon at various flows, at temperatures from 22 to 100°C, on sets of 10 valves with initial zero clearance. The air flow came at a 90° angle for 180 sec. Results showed that deformation was caused either by increasing the temperature with constant air flow, or by increasing air flow at constant temperature. The greater the deformation of surfaces, the more significant the pressure of the air flow became in deforming the valve further. Reducing the hypothetical

module of compression and durability balance during stretching was not compensated by increased elasticity. Both surface damage and deeper pitting were observed. Figures 3; references 7 (Russian).
[292-12131]

UDC 678.7-9

PROPERTIES OF MODIFIED RESINS WITH VARYING ZINC OXIDE CONTENT

Moscow KAUCHUK I REZINA in Russian No 7, Jul 82
(manuscript received 29 Oct 81) pp 14-16

SHVARTS, A. G., KOKOREVA, O. A., KNYAZEVA, L. A. and YEVSTRATOV, V. F.,
All-Union Scientific Research Institute for Tire Production

[Abstract] Chemical modifiers used to obtain specific properties in resins frequently involve sulfur as a vulcanizing agent, an organic accelerator and a linking activator, which is often zinc oxide. The authors studied zinc oxide and the most common modifiers, ethylenethiourea, "RU", "PNDFA" and "GKhPK" [expansion unknown], and a combination of RU + GKhPK. Data showed that without a modifier, increasing zinc oxide content brought increased tension at 300% stretching and increased durability, and reduced relative lengthening. Introducing modifiers, particularly ethylenethiourea, brought high parameters even without zinc oxide. Increasing zinc oxide beyond the initial 2 parts by weight without fillers did not improve durability or tensile strength. The greatest difference was noted when 30 parts by weight of industrial carbon were introduced; this gave greater overall strengthening than 5 parts by weight of ZnO. Overall results indicated that adding "RU" as a modifier made it possible to reduce zinc oxide content in filled mixtures based on polyisoprene. Figures 3; references 11: 9 Russian, 2 Western.
[292-12131]

UDC 678.074.046.39

PROPERTIES OF RESINS FILLED WITH DOMESTIC PORTLAND CEMENTS AND CEMENT POWDER

Moscow KAUCHUK I REZINA in Russian No 7, Jul 82
(manuscript received 7 Apr 80) pp 16-17

SHIPINA, G. V., DEVIKINA, L. I., KRASOVSKIY, V. N. and GROMOVA, Ye. N.,
Leningrad Technological Institute imeni Lensovet

[Abstract] The authors studied the effects of cement type on resin properties and the possibility of using cement powder as fillers for NK,

SKN-40 and SKS-30ARKP rubber resins. The highly alkaline cements used contain metal oxides and are active fillers and vulcanization activators. The test mixtures were vulcanized at 133 and 143°C. The cement fillers were seen to allow shorter vulcanizing time in idrect relation to the cement quality, while the hypothetical balance module and the content of bound sulfur were the same as those when chalk or kaolin were used as fillers. The cement-filled resins were highly resistant to thermal aging, and other parameters equaled those when other fillers were used. Figure 1; references 3 (Russian).
[292-12131]

UDC 678.063:539.217.5

EFFECT OF TEMPERATURE ON GAS PERMEABILITY OF GASKETS

Moscow KAUCHUK I REZINA in Russian No 7, Jul 82
(manuscript received 22 Jul 81) pp 27-31

BARANOV, N. S., GIMAYEV, R. K., SOKOLOV, V. Ye. and YEL'KIN, A. I.,
Moscow Order of Labor's Red Banner Engineering and Designing Institute
imeni V. V. Kuybyshev

[Abstract] Since previous tests of gas permeability of polymeric materials had been conducted over narrow temperature ranges, the authors studied gas penetrability through joints sealed by rubber gaskets of various round and square shapes, at -50 to +120°C. Methyl-styrene rubber was vulcanized to the test cassettes. Magnitude of gas flow depended on such factors as gasket temperature, pressure of test helium, compression, and form, material and design of the casette tested. Since design factors have been regarded as unrelated to gas permeability, temperature and pressure parameters were studied. Calculations showed the linear dependency of these parameters. At constant temperature, helium pressure was found to be unrelated to permeability. At reduced temperatures establishment of gas equilibrium on both sides of the gasket took as long as 4 days at -50°C. Temperature factors and their impact on permeability and diffusion can be used in designing various types of gaskets with varying compression for specific needs. Figures 7; references 9: 4 Russian, 2 Russian translations from English, 3 Western.
[292-12131]

UDC 668.8:628.543.34

DECOLORIZATION OF EFFLUENT WATERS FROM PRODUCTION OF CATION AND DISPERSION DYES USING SODIUM HYPOCHLORITE

Moscow KHIMICHESKAYA PROMYSHLENNOST' in Russian No 6, Jun 82 pp 341-342

ENDYUS'KIN, P. N., DYUMAYEV, K. M. and BUYNOVA, N. I.

[Abstract] In the title program, study was made of the degrees of decoloring, and biochemical oxidizability, and content of active chlorine as a function of the temperature of the process used, pH level, oxidizer consumption and length of processing. Decolorization was conducted on daily samples from industrial collectors for a month, in an experimental device. With consumption of 3 g/l of active chlorine, the color index increases by an order of 2, apparently due to formation of dyes from amino-compounds. Increasing the oxidizer to 7 g/l brought oxidation of ammonium ions and of dyes and other organic compounds, reducing water coloration by 96.9%. Residual active chlorine content was 400 mg/l. These and other parameters indicate that the water could be forwarded to biological purification systems. The experimental method underwent successful production testing. References 3 (Russian). [288-12131]

UDC 628.32

PURIFYING SEWAGE OF MERCURY

Kiev KHIMIYA I TEKHNOLOGIYA VODY in Russian Vol 4, No 3, May-Jun 82 (manuscript received 29 Jun 81) pp 247-248

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[Abstract] While numerous foreign and Soviet patented processes are aimed at removing mercury from sewage by various physico-chemical means, they are complex, require elaborate equipment, and expend expensive reagents which are in short supply. The authors describe a simpler and more effective procedure based on heating waste water to 50°C and then processing it with

sodium polysulfides and iron chloride. Experimental data indicate that complete purification is achieved with use of 1.6-2 mg of polysulfides and 2-4 mg iron chloride, per mg of mercury when its concentration in sewage is 20 mg/l and with pH of medium is 6.5-7.0. References 23: 7 Russian, 1 Romanian, 15 Western.
[287-12131]

UDC 628.547.16:35

CLEANING WATER RESERVOIRS OF INDUSTRIAL DISCHARGES FROM CHEMICAL FIBER MANUFACTURE

Kiev KHIMIYA I TEKHNOLOGIYA VODY in Russian Vol 4, No 3, May-Jun 82 (manuscript received 26 May 81) pp 249-252

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[Abstract] The problem of effluent has accompanied expansion of chemical fiber production, which was nearly doubled during the past Five-Year Plan. Physico-chemical and biological purification procedures are widely employed; attempts have also been made to reduce water consumption in production, by such innovations as continuous polymerization and forming of filament in capron production, continuous lavsan production involving terephthalic acid and ethyleneglycol, etc. Research by the All-Union Institutes of Synthetic Fibers and of Water Supply, Water Systems, Hydrotechnical Installations and Hydrogeological Engineering has developed a flotation purification system which is described in this article. Combined with filtration, it yields water that is suitable for recycling in fiber production. Biochemical double purification at the Chernigov chemical fiber plant has had similar results. Procedures for recycling water from caprolactam fiber production and use of chemical mutagens such as nitrozomethylurea and dimethylsulfate to remove polyamide fiber residues and lubricants are also described. Figures 3; references 10 (Russian).
[287-12131]

MISCELLANEOUS

UDC 547.568.1-39+547.538-39

SYNTHESIS OF ARALKYL HYDROXYDIPEROXIDES AND DIPEROXIDE MONOMERS BASED ON THEM

Leningrad ZHURNAL ORGANICHESKOY KHIMII in Russian Vol 18, No 6, Jun 82
(manuscript received 5 Oct 81) pp 1209-1212

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[Abstract] Hydroxyperoxides are an important type of functional peroxide capable of various chemical conversions at the hydroxyl group while preserving the O-O bond, thus permitting synthesis of other types of peroxides with required structures and properties. As a result of homolytic breakdown of the O-O bond they are capable of initiating free radical processes. The authors synthesized aralkyl diperoxides with a hydroxyl group and monomer derivatives of isopropenylbenzene. Hydroxydiperoxides were synthesized by the reaction of ketodiperoxides with methylmagnesium bromide. Unsaturated diperoxides were obtained by dehydration of the former through heating in an acetic acid solution in the presence of catalytic amounts of iodine. The monomers produced were not capable of radical homopolymerization, but could be stored for long periods. Structures were confirmed by reaction with hydroperoxide of tert.-pentyl, producing corresponding triperoxides, or by dihydroxylation with peracetic acid. Chemical procedures are given in the experimental section. References 6 (Russian).
[284-12131]

CSO: 1841

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